Ontario

Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario

Submissions

v. 6

ROYAL COMMISSION ON ASBESTOS

INDEX OF WRITTEN SUBMISSIONS

BINDER VOLUME NUMBER: 6

Brief No.	Author	Author Category	Subject Matters	Phase I Hearing Requested	Legal Standin[g] Request[ed]
047	Mrs. Odette Dodds	Labour	I Health II Workplace VII Workmens Comp.	Yes	Yes via AV[ ]
048	Mr. Dwight Oland	Labour	I Health II Workplace VII Workmens Comp.	Yes	Yes, via AV[ ]
049	Prof. E. J. Farkas	Individual	I Health II Workplace	No	No
050	Woodsreef Minerals Ltd.	Industry	II Workplace	Yes	No
051	Mr. Douglas Wray	Labour	I Health VII Workmens Comp.	No	No
052	Mr. D. W. Bishop	Labour	I Health VII Workmens Comp.	No	No
053	Provincial Building & Construction Trade Council	Labour/Mgt.	II Workplace III Buildings	No, but perhaps follow-up	No

INDEX OF WRITTEN SUBMISSIONS

BINDER VOLUME NUMBER: 6

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054	Bruce Koffler	Individual	IV Other	No	No
055	Majorie Shorting	Labour	I Health II Workplace	Yes Feb. 16	Yes AV
056	Sandra Elia	Individual	I Health II Workplace III Buildings IV Other V Institutional VI WCB	No	No
057	Ontario Hospital Association	Other Organizations	I Health III Buildings IV Other V Institutional	No	No
058	A.W. Wilson, Process Equipment Limited	Industry	IV Other	No	No
059	London C.U.P.E.	Labour	III Buildings	Yes	Ye
060	Bendix Automotive of Canada Ltd.	Industry	II Workplace	No	No
061	Ontario Ministry of Labour	Government	II Workplace III Buildings	Yes	Yes
062	Professor Frank Innes	Individual	I Health V Institutional	Yes	No

July 30th, 1978.

After John's death a friend asked me, how do you fight a Company like Johns-Manville? Here are the ingredients for a good recipe.

1. Don't panic.
2. It's not illegal to fight for your own rights, it's only common sense. By doing so, you shall gain pride and respect.
3. (Husband and wife) should support each other physically and mentally and you will know how to fight and live.
4. Love and be loved. Be close to one another and you shall be able to accept and cope with any kind of problem and situation, we did.
5. Determination is a down payment to success.
6. It's not what you have that makes you rich, it's what you are.

JOHN DODDS 27-1-1290 - 27-7-1978

At one time I used to think Johns-Manville Company was a good Company to work for. John was telling me in the past, it was not a bad Company, because there was no pressure and pushing, because they knew that asbestos caused asbestosis and many other diseases.

Through my own experience, I shall say Johns-Manville was a good Company to work for as long as you were healthy, but the day you were sick, really sick, they try to get rid of you, as fast as they could, so they would not have to pay compensation.

It's a Company that needs to be smartened up, although, they are not the only ones...

ODETTE DODDS

When John was called over the Company Doctors about his illness, the Company Doctor told him there was no cure, no treatment, no medication for the illness, and if you try to get any compensation you may as well forget it because I don't think you will get any. The Doctor suggested you may as well keep on working.

The right answer is, keep on working, Johns-Manville will kill you a little faster.

As John said before he died, once you have worked half a life time with asbestos, it does not pay to have an early retirement.

Once you reach 55, they may as well take a gun and shoot you. You would have been better off?...

Rest in peace, we won't forget you.

ODETTE DODDS

XMAS EVE 1955

John Dodds

C. Debresser

Red McEachern

Jim Hallow

Clifford Vowels

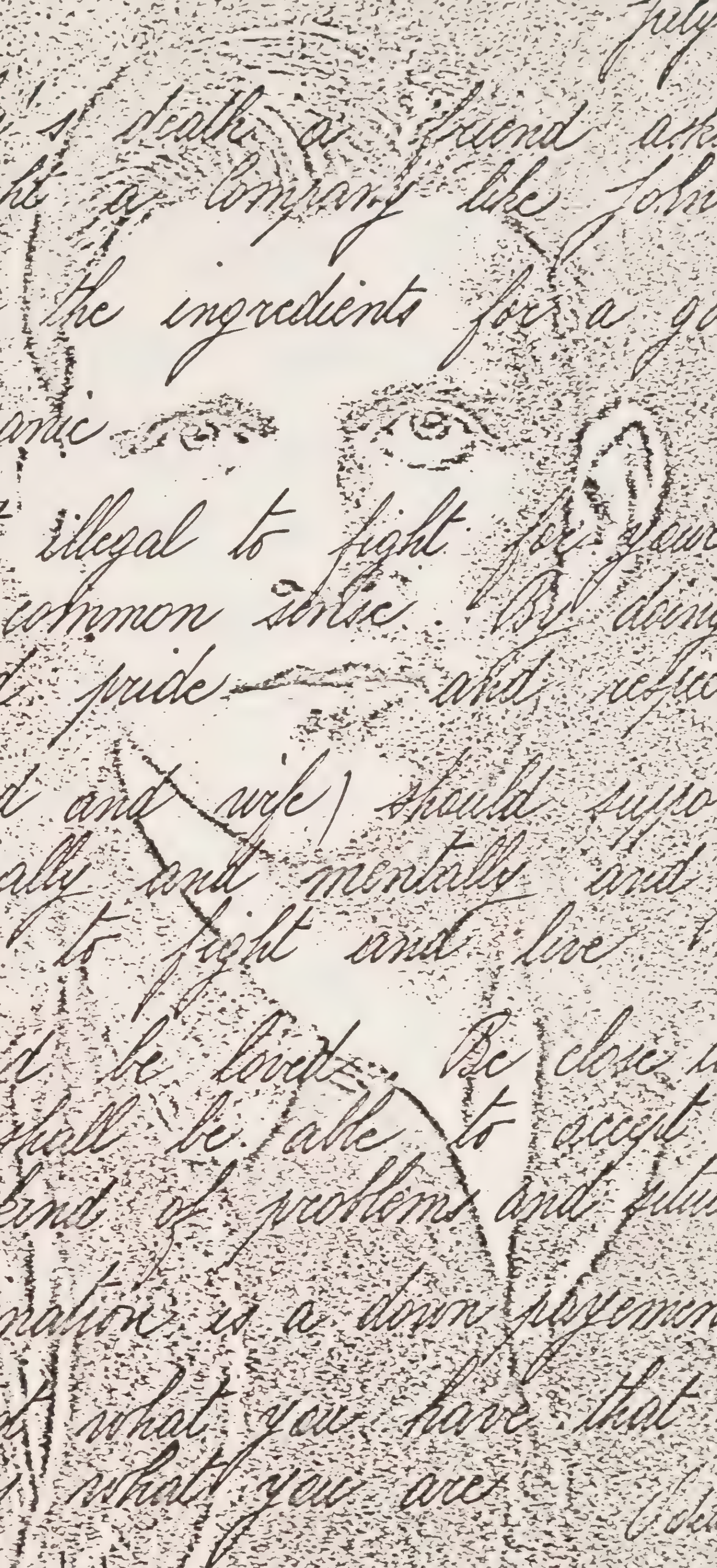
Percy Vowels

So much happiness was expressed on their faces. If they only knew the sad, painful future awaiting them. All these men are dead now!

REST IN PEACE

This picture was taken in Xmas 1955. I remember it so well. John was on afternood shift and asked me if I minded after work that he would spend a few hours with his working friends, now most of them are dead and it is with sadness and sorrow I look at it.

ODETTE DODDS



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Odette Dodds.

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Odette Dodds.

November 22nd 1974.,

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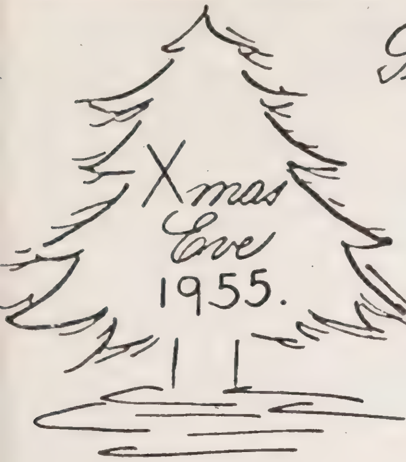

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Odette Dodds.

By Dwight Oland
Asbestos Victim
Claim S10458096

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Brief submitted to Royal Commission on Asbestos

Public Hearing - February 19, 1981 - 900 Bay Street, Toronto

Mr. Chairman and Commissioners:

Again I have the privilege of addressing the Commission and at this time I wish to enumerate additional comments and problems and/or elaborate on those expounded on February 16 with respect to working conditions at the Johns-Manville Scarborough plant, continuing and existing even after ten to 15 years of the plant's having been in operation.

I served on the Union Executive in several capacities as well as shop steward, Chairman of the Compensation Committee, Time Study Committee and on the environmental committee. I was well aware of the working conditions, and I must say I consider myself lucky to have been able to work in a clerical capacity for the last half of my 30 years of service at the plant.

Many employees questioned the dusty conditions in the work areas. Clouds of dust were thrown out by processing machines drifting through the air and eventually falling to the floor. This same dust was sucked up by passing trucks frequently - in servicing the machines. The dust then cascaded towards the ceiling. Then the vicious circle began: the heater fans installed near the ceiling forced the dust back down again, time after time all day long.

The employees continually complained about the dust even though many of them were unaware of the danger of inhaling the dust. It was a nuisance at least- it was on their clothes, it was in their lunches, their coffee cups, it was everywhere - it collected in their autos, and was taken to their homes hanging from their clothes. The company's attitude was: don't worry about it. A little bit of dust won't hurt you. We'll see if we can fix it. Either you work in it or get off the job.

Trying to get the Company to lessen the amount of dust, to teach and maintain good housekeeping had about the same effect as trying to bore a hole in a brick wall with a pencil eraser. No mandatory protection was afforded to guard against inhaling asbestos - or any other dust. At this time it would amount to admission of guilt. Then men began to die. We know why, the Company professed ignorance of the cause, and the WCB didn't want to hear about it. Consequently, no one was receiving compensation. Even some who obviously were off sick were not considered for compensation except for Travellers of Canada sick benefits.

Eventually the company began to show some signs of consideration. Dust samplers were used to measure the fibre count. It seemed obvious to the men that reports of such dust counts could not pertain to their own machine when it was in full swint. It also seemed add that many of the dust collectors were placed up-wind from whence the dust was coming. Again, such checks were continued while the men were on coffee break or at lunch.

Additional dust removal equipment was installed (somewhat late for some of the fellows I knew) and also for some who are still alive. The new equipment helped, but dust conditions continued to remain abominable. Company promises were a dime a dozen - and they were never kept - hardly ever. Grievances were lost and thrown out by the dozen.

Even when the company got around to issuing some dust masks they were intended for specialized areas only - the company couldn't conceive that the dust could spread throughout the entire area.

The masks became a farce - as long as the man had one stuck on his head somewhere it was o.k. - that is, according to the way some supervisors regarded them, but it was the duty of the supervisors to demand that these men wear them properly, whether it be for five minutes or five hours. The wearing of masks was not really enforced by the company - not until about 1980.

Perhaps some might wonder why the men continued to work under such adverse conditions. If he happened to be a summer student, he didn't much care- he would leave in 2 or 3 months, but that does not apply to the long term employees.

The answers are many, varying according to the reason of the individual. Generally speaking, many of the answers could apply to most of the employees

The idea of having or NOT having a job. In those days nobody wanted to lose his job. Another reason for staying on the job stemmed from the practice of various company officials convincing them there was really no danger working in that kind of dust meanwhile supporting their deathly statements by setting personal examples which I might add lead to their own funerals - and some of those fellows were even friendly.

As time went by, and as the workers became more alarmed because of publicity in the media, the company put on some more show by adding extra equipment in order to lessen the amount of visibly excessive dust. There had been times when you couldn't make out who was working 10 or 12 feet away - many times you couldn't see the opposite wall. Complaints still had no effect.

At night it was harder to see the dust, but you could taste it. On a sunny day you could point out volumes of dust dancing in the sun's rays from the windows. After that the windows were painted, but just because you couldn't see the dust, you still knew it wasthere - by smell, and by taste.

The Company Doctor wasn't one to tell you how bad your condition was becoming, even though he was the family Doctor to many employees. We knew his big job was working for the Company.

Reports requested by family doctors from the staff of the Ministry of Health containing technical data and terminology which even if a G.P. were able to follow left much be to desired such as being incomplete, irrelevant, misrepresentative implied, repetitious and sometimes false - and so the employee would still be in the dark about his chest condition.

Another reason for not leaving was because of the company's apparent general apathetic approach to hold the older men - these men had acquired useful knowledge and became skilled. It was costly to hire new men who had to be trained using up valuable production time to do it. In order to do this tactics apparently used by the company included:

-- refusal to inform the employee of his chest condition until it became to obvious to hide;

-- refusal to properly educate employees who became contaminated as to the implications of continued exposure;

-- failure to warn asbestosis can become only worse - never better - no cure - and that a multitude of slight changes could accumulate causing death;

-- the rank and file were unaware of their prerogative of viewing and checking their own personal files so they might spot errors and elect to act on them accordingly.

From the above listed, it is easy to see how men could fall into a state of complacency and false security. How many unlucky ones would be here today if they had been systematically and truthfully alerted as to their worsening chest conditions? How many could have elected to take jobs elsewehre long before they became incapacitated?

Other reasons for staying at J-M were because many of them were too old to look for another job - and those who had asbestosis - well who would hire them - and even if you had asbestosis you couldn't quit - the WCB pension wouldn't keep you alive.

I would next like to comment on the "Summary of Information" requested from the WCB by my Legal Counsel in preparation for an appeal to my claim S10458096. After studying this brief - or summary - I could only conclude it should be considered a compilation of mystery, intrigue, and a brilliant instrument to present to any body or court, guaranteed to mislead and confuse the panel by its many incomplete, untrue and implied statements. With such as their guide, it would be a foregone conclusion as to the ultimate findings of the court regardless of their own individual and personal objective views.

It has been noted references to arthritis and heart attack prominently place these two conditions so as to obscure the issue - that of the initial claim and subsequent appeal. All inferences other than those relating to asbestosis should be disregarded and stricken from the records.

Statements to the effect I was unable to work in 1967 and 1975 are false. References to annual changes as being insignificant could be true if one considers only one year. When many such changes are aggregated over a period of 8 to 12 years they can no longer be termed insignificant.

Other damning and refutable statements include "grossly limited activities" -- "suffered with arthritis for 10 years" -- "arthritis is all joints" -- those that aren't false were taken out of context.

I mentioned on February 16 past that I had problems with Dr. Vingilis. In the Summary he states that I was a very unhappy man suffering with arthritis. He insinuates I was unhappy because of arthritis. The fact of the matter is that that man (I) was furious because of having been lied to, had been given the run-around, and lead down the garden path by supplying my family doctor with partial and false impressions regarding my chest condition.

If that isn't enough to be "unhappy" about - I expect having asbestosis would suffice!

I am thoroughly disgusted with the clutter of garbage compiled under the heading of Summary of Information. It is inconceivable how a body such as the WCB can expect anyone to lend credence to the prestige, reliability and acceptance of responsibility of such department.

I have been talking about how some people were more or less compelled to remain with Johns-Manville, but I come now to a situation whereby the Company utilized the closing of a department to rid themselves of a lot of dead wood - that is, many employees who were unable to do heavy work because of being affected by asbestosis.

I am one example.

When the Transit Pipe Department shut down, most of those men had bumping rights in Insulations. I chose a job comparable to the one I lost - one which I had held for about 16 years - one of which I would have continued to work because of the nature of the job, were it not for the shut down. However, when I was introduced to the new job, I was told I would never be able to do it - just like that. I felt differently. With the 2 weeks training I was to have and with the expected help to get rid of 3 months of congested backlog of purchase orders - some unfilled - some cancelled etc. - I could see no problem. But there was a problem - no one was assigned to train me - the supervisors were unable to help - or as it was obvious to me and other union members, the supervisors did not want me to bump the other chap - and they were all working to that end - consequently I received little training - very little - during the 2nd week the Company sent a man to train me but it took him 3 days to find out what he was to show me.

On about the second last day of my training period the foreman told me I was being taken off the job. He told me I was being transferred to a section where there was no such clerical work I could handle, just bull-work, tossing cartons of fibre glass into transports. No way was I going to be able to do that kind of work - I might last for 5 minutes and then I would be out of breath, or have a coughing fit from working in a dusty truck.

I considered reporting to the WCB that I could not do that or any other work that J-M had available for me - but realizing the problems everyone else had, myself included, was having trying to make ends meet on what the WCB would allow, I decided to forego that avenue for the present, and was able to apply for sick benefits from Travellers of Canada.

I have been recently retired from J-M having reached age 65, but I still am working towards an appear to increase the 10% disability allowed by the WCB. The $100 a month pension does not help a great deal at the present time - but it will depreciate in buying power with each succeeding increase in the cost of living.

February 20, 1981

After hearing just now there is a relation between arthritis and asbestosis, I hesitate to make any mention of my arthritis in case I may detract from or lesson full recognition I look for in support of my WCB claim, and pending appeal.

I had no previous knowledge of such when I prepared by brief - so I leave it to the Commission to decide to accept this as part of my brief or have it for reconsideration. But at least my comments will show where there has been improper communication from all parties responsible for such communication.

University of Waterloo

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Waterloo, Ontario, Canada
N2L 3G1

Faculty of Environmental Studies
Department of Man-Environment Studies
519/885-1211

February 12, 1981

Royal Commission on Asbestos,
180 Dundas Street West,
22nd Floor,
TORONTO, Ontario,
M5G 1Z8.

Ladies and Gentlemen:

I wish to make the following statement to the Commission. I realize that this statement is arriving beyond the time intended.

I believe that it has been absolutely proven that asbestos is an extremely dangerous material. In my opinion then the Commission should not spend a great deal of time on arguments as to whether or not asbestos is dangerous, or on arguments as to exactly what is the mechanism by which asbestos damages human health.

Instead the Commission should devote itself to the question of how exposure to asbestos can be reduced. In order to accomplish this objective, I believe the Commission should compile a list of products made or sold in Ontario which contain asbestos. The manufacturers of these products should be called before the Commission to explain why they think asbestos is needed and to explain what attempts they have made to manufacture their products without asbestos or with substitutes.

In particular, all use of asbestos in construction and materials used in construction should be examined very carefully.

An example of what I believe is a totally frivolous and unnecessary use of asbestos is its use as a backing in linoleum-type floor coverings for home use. Over the last five years there have been hundreds of articles in newspapers describing the devastating health effects of asbestos. To me it is then amazing that the manufacturers of this floor covering can actually boast that their product contains asbestos.

Certainly once installed there is little hazard from this product. But when it is cut for installation purposes, or when it is removed 20 years from now, there is contamination of the building by asbestos.

I believe when a construction worker or a do-it-yourselfer uses a product such as gypsum board or "dry wall" he wants absolute assurance that there is no asbestos in that product. The same applies to all

products used in construction, such as various types of plasters, patching compounds, and sealing compounds.

An area that the Commission should investigate thoroughly is the use of asbestos in piping used in municipal water systems. I don't believe that the Commission should enter into a lengthy debate as to whether or not asbestos used in the manufacture of pipe can enter water being carried in the pipe, or whether asbestos in water is a health hazard.

I believe instead the Commission should look into the engineering question of whether asbestos is needed in manufacture of pipe, and what engineering problems of pipe strength and durability would be met without asbestos. The manufacturers of pipe claim that it is very difficult to manufacture durable and economical pipe without asbestos. I find it very difficult to believe this claim and I think the Commission should examine, very searchingly, the basis for this claim.

Another area of use of asbestos is in automotive brake and clutch surfaces. This use is a source of widespread exposure of workers in the auto parts industry, of auto mechanics, of motorists who service their own cars, and of the general public. The manufacturers of brake and clutch components should be called before the Commission to explain why asbestos has been used, and what efforts are being made to phase out its use.

Yours sincerely,

Edward J Farkas

Edward J. Farkas, Sc.D., P. Eng.,
Associate Professor.

EJF/jf

MAILING ADDRESS:
E. J. FARKAS
MAN-ENVIRONMENT STUDIES
UNIVERSITY OF WATERLOO
WATERLOO, ONTARIO, CANADA
N2L 3G1

WOODSREEF MINERALS LTD.

50

SUITE 1014
159 BAY STREET
TORONTO, CANADA
M5J 1J7

TELEPHONE: 363-1109 AREA CODE: 416
CABLE ADDRESS: "SYDCAN", TORONTO
TELEX: 06-219725

February 19, 1981

Dr. J. Stefan Dupré,
Chairman,
Royal Commission on Asbestos,
Ontario Room,
Macdonald Block,
900 Bay Street,
Toronto, Ontario

Dear Sir:

In 1978 Woodsreef's Australian subsidiary, Woodsreef Mines Ltd., developed a technical breakthrough in milling asbestos using a wet chemical process. This patented wet process would eliminate any environmental hazards associated with milling asbestos.

Enclosed are two press releases. The June 19, 1979 press release states that successful tests have resulted in the production of commercial asbestos cement products using this new wet process. The November 13, 1980 press release states that funds have been raised to build a prototype mill so that the economics of building a commercial wet process mill can be established.

This new process is still confidential, therefore it cannot be discussed at a public hearing. However, the Company wishes to advise you that it stands ready to assist the Commission in whatever way it can.

Dr. R.A. Kuntze of the Ontario Research Foundation has witnessed the operation of the wet process and a number of tests conducted in Australia and has written a report in this regard. He has confirmed to me that he would be available to meet with you if you find it desirable.

Yours truly,

K R Besly

K.R. Besly

KRB:jh
Encls.

WOODSREEF MINERALS LTD.

SUITE 1014
159 BAY STREET
TORONTO, CANADA
M5J 1J7

TELEPHONE: 363-1109 AREA CODE: 416
CABLE ADDRESS: "SYDCAN", TORONTO
TELEX: 06-219725

June 19th, 1979

PRESS RELEASE

Woodsreef Minerals Ltd. announced today that the Company has concluded an agreement with its Australian subsidiary, Woodsreef Mines Limited, whereunder the parent company can earn up to 90% of the subsidiary's interest in a wet process for mining, milling and producing asbestos fibres developed in Australia.

Tests on the wet process conducted at the facilities of an asbestos cement products manufacturer have proven successful, and a wet mill will now be constructed to produce fibre for similar testing by Woodsreef's other customers around the world.

The Australian Government, which made a grant of 50% of the research and development costs for the Woodsreef wet process, is expected to make a similar 50% grant in respect of the construction and operational costs of the wet mill.

Michael Clay, Woodsreef Secretary-Treasurer, stated that the new process is applied to both mining and milling of asbestos fibre, and in addition to eliminating environmental hazards within the industry will also increase mining yield.

Woodsreef Minerals Ltd.

SUITE 1014
159 BAY STREET
TORONTO, CANADA
M5J 1J7

TELEPHONE: 363-1109 AREA CODE: 416
CABLE ADDRESS: "SYDCAN", TORONTO
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November 13, 1980

P R E S S   R E L E A S E

Yorkton Securities Inc. and Woodsreef Minerals Ltd. of Toronto today announced they have arranged to place privately, $2,050,000. convertible debentures which funds enable:

a) Woodsreef Minerals to exercise its option to purchase 45% of the recently patented Wet Milling Process for asbestos - this process eliminates any environmental or health hazards associated with the milling process;

b) the construction, operating and manning of a Wet Prototype Mill; and

c) the settlement of all funded indebtedness of Woodsreef Minerals.

A public financing to allow restructuring of Woodsreef's operating mine in Australia will follow.

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2 Bloor Street East
Toronto, Ontario
M4W 3C3
Telephone (416) 965-8851

Workmen's Compensation Board

Linda
As discussed in telephone
Conversation
D. Wray

February 17, 1981.

Mr. Douglas Wray,
942 Reytan Blvd.,
Bay Ridges, Ontario.
L1W 1Y7

Dear Mr. Wray:

Claim S12564241

As you are aware, the Adjudication Branch has been making enquiry with respect to your chest disability and its relationship to your employment. This matter has now been referred to the Review Branch for consideration.

I would like to take this opportunity to apologize for the delay in rendering a decision in this matter; however, considerable investigation was necessary from a medical standpoint in order to clarify an exact diagnosis and its relationship to your employment. This necessitated a review by the Advisory Committee as well as an independent study by Dr. A. C. Ritchie, Chief Pathologist University of Toronto. I hope that this delay has not been too much of an inconvenience to you.

In order to establish entitlement to payment of medical aid and compensation benefits, it must be shown that your disability was the result of an accident in the employment or arose out of and occurred in the course of the employment within the provisions of the Act.

We received information from your employer indicating that you were recovering from a thoracotomy and pleurectomy as treatment for extensive pleural thickening. There was a history of occupational exposure to asbestos and it was felt that these particular surgical interventions were necessary because of your exposure to asbestos.

It is our understanding that you were off work from March 3rd, 1980, and are claiming compensation benefits from that particular date.

Cont.................

Claim S12564241 - Douglas Wray - Cont..........

Initially, your disability was diagnosed as acute broncho-pneumonia. This did not appear to resolve and consequently, a collapse of the left lung developed particularly the left lower lobe. Due to a suspected carcinoma, further tests were carried out by way of a thoracotomy and pleurectomy. The results of that particular biopsy report showed no evidence whatsoever of any malignancy.

A review by the Advisory Committee in October of 1980 showed an absence of any asbestosis. Dr. A. C. Ritchie was then asked to review the tissue and has also concluded that although exposed to asbestos, there was no evidence in the biopsy that this exposure had damaged your lungs. Fibrosis of the sort seen in asbestosis was not present.

Our Chief Consultant in Industrial Diseases has also had the opportunity of reviewing all of the documentation on record and has expressed the opinion that unfortunately you are not suffering from any compensable disorder which could be related to your exposure to asbestos while employed with Ontario Hydro. The surgical procedures carried out would appear to have been for diagnostic clarification but not for any specific asbestosis.

The Review Branch has carefully considered all of the information available at this time and while we accept that you have been exposed to asbestos fibres while employed with Ontario Hydro, there is no evidence to support that you are in fact suffering from any work related disability and in particular, asbestosis and under the circumstances, regretfully we are unable to accept entitlement for payment of medical aid or compensation benefits as we have been unable to establish that your disability arose out of your employment.

The above decision is open to appeal and information on the appeals procedure may be found in the attached pamphlet.

A copy of this letter is being forwarded to your employer.

Yours very truly

M. F. Bompas

M. F. Bompas
Claims Review Branch
Encl. I.A.A.
rl

The Workmen's Compensation Board
2 Bloor Street East, Toronto, Ontario M4W 3C3

Telephone (416) 965-8880

Lincoln M. Alexander, Q.C.
Chairman

February 18, 1981.

Mr. Douglas Wray,
942 Reytan Blvd.,
Bay Ridges,
PICKERING, Ontario.
L1W 1Y7

Dear Mr. Wray:

Claim S12564241

I have now had an opportunity to review the issues raised in your letter of February 3, 1981 with Senior Members of the Claims Adjudication Branch.

It is unfortunate that delays occur in complicated cases such as yours and I realize they can cause frustration and concern. Extensive medical reviews were required however such as your appointment with the Advisory Committee and an independant review by Dr. A. C. Ritchie, Chief Pathologist, University of Toronto. These reviews were undertaken to ensure every consideration was given in determining the exact diagnosis and it's relationship to your asbestos exposure while working for Ontario Hydro.

It is the policy of the Workmen's Compensation Board to keep the injured employee informed of the on-going status in the claim. In your telephone conversations with the Claims Adjudication Branch it was thought that you were aware and did understand the activity taking place in your claim.

Continued.....

Claim S12564241 - Douglas Wray

I see from the comments in your letter that this was not the case and accordingly I readily understand the extent of the inconvenience you suffered for which I extend my apologies.

On the otherhand, I hope you can realize that in cases such as this the need to compile all evidence related to the claim can be time consuming, but rest assured the Board is attempting in every way to shorten the investigative process.

I understand that a decision has been made in your claim and that a letter was forwarded to you on February 17, 1981. You have been advised, of course, regarding your right of appeal but in any event I want you to know I do not treat your comments lightly.

Yours sincerely,

The Workmen's Compensation Board
2 Bloor Street East, Toronto, Ontario M4W 3C3
Telephone (416) 965-8880

Lincoln M. Alexander, Q.C.
Chairman

9 February 1981

Mr.Douglas Wray,
942 Reytan Blvd.,
Bay Ridges,
Pickering, Ontario.
L1W 1Y7

Dear Mr. Wray,

Claim No. S-12564241

I have received your registered letter of February 3rd, 1981, and am sorry to hear of the difficulties you have experienced since last March. Please be assured that I will look into the matters you have raised and as soon as possible I will write to you again.

Yours sincerely,

9?2 Reytan Blvd.
Bay Ridges, Ont.
Pickering

February 3rd, 1981

Mr. Lincoln Alexander,
Chairman,
Workmen's Compensation Board,
2 Bloor Street East,
TORONTO, Ontario M4W 3C5

Dear Mr. Alexander:

Re: Claim No. S12564241

I am writing to you personally to ease my frustrations involving the establishment of the above-mentioned claim.

On March 5th, 1980 at the Ajax-Pickering General Hospital I had a Bronchoscopy to determine the cause of collapse of left lung and possible tumor which concerned my doctor when X-rays taken in early January showed a shadow that did not disappear when antibiotics were administered (a hacking cough of two month's duration had finally driven me to see my doctor at that time)Shortness of breath was another symptom being experienced.

After the Bronchoscopy, my doctor, Dr. R. McYuen and the Surgeon, Dr. E. T. Salmon advised me that in their opinion an operation should be performed for a possible removal of the lower lobe of my left lung. This surgery was performed on March 10th at the same hospital.

While recuperating at the hospital the doctors informed me that they had found asbestos had impregnated the plural lining of my left lung and with the removal of the plural lining the lung had become inflated again. No malignancy was found in the biopsy of the lung lining or lung tissue.

My employer, Ontario Hydro, was informed of the findings on the sick report which was received by me after the surgery. Dr. Salmon filled in the report in my room at the hospital indicating the finding of asbestos and the removal of the lung's lining. He also noted that the Compensation Board should be informed by check mark on the form.

On June 10th, 1980, Dr. M.C. Wills, Ontario Hydro Staff Physician came to see me at my home. He informed me that a claim was being filed on my behalf.

....2

Mr. Lincoln Alexander February 3, 1981.

A letter dated July 9th, 1980 was received from The Workmen's Compensation Board with Employee's Report information forms to be filled in and returned. This was done.

A letter dated August 19, 1980 was also received requesting additional information regarding exposure to irritants. To this letter I replied by a telephone call to the Adjudication Branch telling them of the exposure to Asbestos and asking if a letter was required and was told it was not necessary.

On September 10, 1980 I again phoned The Compensation Board giving the claim number and was informed that they were awaiting additional information from my employer, Ontario Hydro. I had seen Ontario Hydro Staff Physician, Dr. M. Wills on September 9, 1980 for a medical assessment to return to work on a half-day basis. At that time I was told that all information had been obtained.

On September 25, 1980 I again telephoned The Compensation Board and was advised to call back in a few days, which I did on October 6th. I was advised that an appointment was made for me to be seen by the Board's Advisory Committee on Occupational Chest Diseases, 50 Grosvenor Street, Toronto, on October 9, 1980 at 1.00 p.m. and that a letter confirming this was on the way. This letter did not arrive until October 15th and was dated Oct. 6th, 1980. The letter said "PLEASE PRESENT THIS LETTER WHEN REPORTING". Needless to say, when I reported to 50 Grosvenor St. on October 9th at 1.00 p.m. there was some confusion in locating previous X-rays and medical reports. After having a chest X-ray and part way through the medical and pulmonary tests, the report was finally located.

I was informed it would be several weeks before the report would reach the Compensation Board. During my next contact on November 3rd, I was told it might take as long as six weeks before a report would be received.

On November 19th another phone call was made and was told that I do not have Asbestosis and therefore I should be happy, and that I would have something in writing within a couple of days.

On November 27th I phoned again and was told it was up to the Medical Division and that it would likely be a few more days. On December 4th I was told once again that it was up to the Medical Division.

On December 5th, 1980 Compensation Board Claims Adjudicator called telling me that the Compensation Board's Dr. Stewart had asked for an opinion from a Dr. A. Ritchie and that I would be receiving a letter from Dr. Stewart.

. . /3

Mr. Lincoln Alexander February 3, 1981.

On December 12th I attended the public meeting of the Royal Commission on Asbestos. After the meeting, I had your Dr. Stewart pointed out to me and decided to take the opportunity to introduce myself and ask him if he recalled the case and if a letter would be forthcoming. He was in a hurry so it was a brief encounter. But he did say that when they operated on me they were looking for cancer and that they were waiting for Dr. Ritchie's report before a decision would be made.

On January 5, 1981 I called the Board again and was told I would not receive a letter from Dr. Stewart seeing that I had spoken with him in a chance meeting and to call in two weeks' time.

On January 20th I again called - there was still no report. However, at 5:45 the same afternoon (Jan. 20th) I had a call from an Adjudicator saying the report was in and should be typed in the course of a couple of days.

On January 26 was in touch again and told they had not seen the report but it should be along in a couple more days.

On February 2nd another phone call. This time I was told I had misunderstood; they had not received the report from Dr. Ritchie yet.

Now, on February 3rd with the assistance of the Hydro nurse I obtained a phone number and located Dr. Ritchie and spoke with him. He informed me that as far as he could recall the report had been sent some time ago to the Compensation Board.

As you can well understand, this further leads to more frustration and confusion regarding my claim status after 11 months.

Fortunately, I work for Ontario Hydro and had accumulated a goodly number of sick days which helped to ease the strain of reduced wages. I am now working 3/4 days.

I realize that in all large organizations it takes time to sort things out and into the proper channels, etc., however, I think you will agree one tends to lose patience and heart when things seemingly are at a standstill after such a lengthy time for an occupationally related lung disease.

I trust that perhaps you have been enlightened by the problems I have experienced in this system and I thank you for any assistance you may be able to render on my behalf in this matter.

Yours sincerely,

....

Douglas Wray

Tel. No. 839-1076

DW/nw
Registered Mail

return to

refer to

pink copy

MR. P. BUEHL
Station Personnel Officer

1980 09 11

R.L. Hearn G.S.

Douglas WRAY
Birth Date: July 28, 1933
Shift Maintainer I
R.L. Hearn G.S.

I saw Mr. Douglas Wray, a Shift Maintainer I, at Head Office on September 9, 1980. This man has had a lengthy absence due to an occupationally related lung disease. He is now fit to return to work.

There are however some work restrictions. This man should not work in dusty areas where there is an occupational dust exposure to fly ash, coal or asbestos. He is fit to work as a Welder and should have no trouble wearing the necessary respiratory protection that Welders use from time-to-time.

In order to facilitate his return to work, I suggest that he work half days for the first two weeks.

This man should be reassessed in two months time. Please let me know if you have any questions about him.

INFORMATION COPY
ORIGINAL SIGNED BY
DR. M. C. WILLS

M.C. Wills, M.D.,
Staff Physician
Health Services Department
Health and Safety Division

MCW:dh

cc: Mr. A. Clinker
Mrs. A.M. Townsend, R.N.

968-0334:3 rev. 6-77

RECEIVED
OCT 15/80

2 Bloor Street East
Toronto, Ontario
M4W 3C3
Telephone (416) 965-8831

The Workmen's Compensation Board

October 6, 1980.

Mr. D. Wray,
942 Reytan Blvd.,
BAY RIDGES, Ontario.

Dear Mr. Wray

Claim S12564241

Arrangements have been made for you to be seen by our Advisory Committee on Occupational Chest Diseases, 50 Grosvenor Street, Toronto, Ontario on Thursday, October 9, 1980 at 1.00 p.m. Please report to the Advisory Committee on that day.

Your entitlement to benefits under the Workmen's Compensation Act will be determined on receipt of the Advisory Committee Report. It usually takes several weeks for the Committee to prepare their report as it is necessary to obtain all prior x-rays and medical documents.

Attached is a Transportation Warrant. It is suggested that you contact the local railway or bus agent at once to secure the necessary accommodation. On presentation of this Warrant, you will be given a ticket.

Should you choose to drive your own car, we will issue a cheque in your favour, as quickly as possible, on the submission of the attached Warrant.

Please notify your employer of these arrangements. If, for any reason it is not possible for you to keep this appointment, please advise the Workmen's Compensation Board, and return the unused Warrant.

Yours truly,
DW Dyer MD per KR.
D. W. Dyer, M.D.,
Chest Disease Specialist,
Medical Branch,
Medical Services Division.

PLEASE PRESENT THIS LETTER WHEN REPORT

Firm No. 801165
Rate No.

When writing the Board please quote the above file number
1773 (07/60)

September 30, 1980

R.L. Hearn TGS

NT22 08901

Re: Douglas Wray
Shift Maintainer I - R.L. Hearn TGS

I have been advised by Dr. M. Wills of Ontario Hydro's Health and Safety Division that, in his opinion, Ontario Hydro employee, Mr. Douglas Wray, has an occupational illness that is asbestos related.

A Workman's Compensation Board Claim has been initiated by Ontario Hydro's Health Services Department on Mr. Wray's behalf and the board alone will decide on the validity of the claim.

This letter is written to comply with Chapter 83, Section 25 (2) of the Occupation Health and Safety Act, 1978.

Peter Buehl
Station Personnel Officer
R.L. Hearn TGS

PB:sn

cc: Mr. D. Wray
Dr. M. Wills
Mr. R.B. Kennedy
Mr. J. Gulley
CUOE Union President
Industrial Health and Safety Branch
Health and Safety Committee

rio hydro

440 Unwin Avenue, Toronto, Ontario, Canada M4M 3B9

R.L. Hearn TGS
September 16, 1980

NT22 08901

Mr. D. Wray
Shift Maintainer I
R.L. Hearn TGS

Dear Doug:

Return to Work

We have received information from our Health and Safety Division that you are now fit to return to work on a restricted basis. You will be working half days for the first two weeks and full days thereafter.

You are not to work in dusty areas where there is an occupational dust exposure to flyash, coal or asbestos. You are expected to wear the appropriate respiratory equipment as necessary when working. Medical Services will re-assess your condition in two months time.

Please contact me if you have any further questions.

Yours truly,

A. Clinker

A. Clinker
Mechanical Maintenance Superintendent
R.L. Hearn TGS

AC:lc

cc R.B. Kennedy
P. Buehl

ontario hydro
700 University Avenue, Toronto, Ontario M5G 1X6
592-2457

July 25, 1980

Mr. D. Wray
942 Reytan Blvd.
Bay Ridges, Ontario
L1W 1Y7

Dear Mr. Wray:

Enclosed, please find a Physician's Progress Report on Illness to be completed by your attending physician.

A report was sent to you on May 19, 1980, but has not been received back in this office. Please sign the enclosed report and have your physician complete the form and return it to this office in the envelope provided. This is necessary for the continued payment of your benefits.

If you have any questions regarding this matter, please do not hesitate to call.

Thank you.

Yours truly,

K. McArthur

(Miss) K. McArthur
Sick Leave Records Clerk
Health and Safety Division

Enc. (1)

G5000 ( )
rev. 2-7.

physician's progress report on illn

ear Doctor:

order to continue my sick leave the health services department of Ontario Hydro requires a progress report at this time. Any report ou make will be kept confidential and should be mailed to the staff physician in the pre-addressed and stamped envelope provided. there is a charge for completion of this report, I understand it is my responsibility. I authorize release of all this medical informatior

employee's signature

nloyee's name: Mr. D. Wray (5013)

address: 942 Reytan Blvd Bay Ridges L1W 1Y7

agnosis

ogress of illness, including complication

proximate date of return to work: September

date on which this report is based: 1 August 1980

signature

address

for use of health services department of Ontario Hydro

bable date of return to work

sick leave grant: ☐ continued ☐ discontinu

arks

staff physician - health services department

2 Bloor Street East
Toronto, Ontario
M4W 3C 5
Telephone (416) 965-8804

The Workmen's Compensation Board

July 9, 1980.

Mr. Douglas Wray,
942 Reytan Blvd.,
BAY RIDGES, Ontario.

Dear Mr. Wray:

Claim: S12564241

The attached report(s) should be completed promptly and returned to the Workmen's Compensation Board so that your claim for industrial disability may be considered.

When these preliminary reports are returned it is expected that further enquiries and possible medical assessment may be required. On completion of these additional enquiries, which may take several weeks, you will be notified regarding your entitlement to benefits under the Workmen's Compensation Act.

Yours very truly,

ADJUDICATION BRANCH

C. Smale

C. Smale
Claims Adjudicator.

DW

When writing the Board please quote the above file number

THE WORKMEN'S COMPENSATION BOARD, ONTARIO

2 BLOOR STREET EAST, TORONTO M4W 3C5 · TELEPHONE (416) 965-8804

EMPLOYEE'S REPORT
OCCUPATIONAL DISEASE

CLAIM NO [illegible]

MESSAGE TO EMPLOYEE

IF THERE IS A DOCTOR'S REPORT FORM ATTACHED, PLEASE TAKE IT TO YOUR DOCTOR FOR COMPLETION.

WRAY DOUGLAS
442 REYTAN BLVD
BAY RIDGES ONT

ACCIDENT DATE

30JUN80 # 691165

ONTARIO HYDRO,
C/O CHIEF PHYSICIAN
700 UNIVERSITY AVE.,
TORONTO ONT. M5G 1X6

SOCIAL INSURANCE NO.

LAST NAME	WRAY
FIRST NAME(S)	DOUGLAS
POSTAL ADDRESS	442 REYTAN BLVD / BAYRIDGES
CITY OR TOWN	PICKERING ONT L1W 1Y7
SOCIAL INSURANCE NO.	409-643-921
PHONE NO.	839 1076

AGE	WEIGHT	HEIGHT	SEX	MARRIED	SPEAK ENGLISH	OCCUPATION
46	165	5 FT. 8 INS.	M	YES	YES	SHIFT MAINT. I / WELDER

GIVE NAME AND ADDRESS OF EMPLOYER WHERE YOU CLAIM YOU WERE LAST EXPOSED TO DUST.

ONT. HYDRO
R.L HEARN GENERATING STATION
440 UNWIN AVE
TORONTO

BUSINESS

GENERATION OF ELECTRICITY

DATE YOU FIRST ENTERED THAT EMPLOY: JAN. 20. 1964

DATE YOU LEFT THAT EMPLOY: —

IF OFF WORK NOW, GIVE DATE AND HOUR OF LAYOFF.

MARCH 3/80

HAVE YOU PREVIOUSLY MADE A CLAIM FOR OCCUPATIONAL DISEASE

NO

GIVE FULL PARTICULARS OF YOUR EXPOSURE TO DUST SHOWING NAMES OF EMPLOYERS WITH DATES OF PERIOD OF EMPLOYMENT WITH EACH EMPLOYER.

IN ONTARIO

EMPLOYER'S NAME	FROM	TO
ONT HYDRO	JAN/64	—

OUTSIDE ONTARIO

EMPLOYER'S NAME	FROM	TO

DATE OF BIRTH

JULY 28 1933

MINERS CERTIFICATE NO.

I DECLARE ALL THE ABOVE IS TRUE AND CORRECT AND I CLAIM COMPENSATION AND/OR MEDICAL AID.

SIGNED THIS 18 DAY OF JULY 19 80 CLAIMANT SIGN HERE Douglas Wray

6S (07/

2 Bloor Street East
Toronto, Ontario
M4W 3C3
Telephone (416) 965-8804

The Workmen's Compensation Board

August 19, 1980

Mr. Douglas Wray,
942 Reytan Blvd.,
Bay Ridges, Ontario.

Dear Mr. Wray:

Claim: S12564241

In reviewing the employment history submitted by yourself and your employer thereis no mention made regarding any irritants which would cause a chest problem. We would appreciate it if you would advise us what type of exposure you consider was the source of your problem and this is the reason why you submitted a claim.

We note in the medical information presented by your doctor that you may be suffering from exposure to asbestos. If this is the case, please advise us where you handled the asbestos, for what period of time, etc.

Yours very truly,

ADJUDICATION BRANCH

MR

F. P. Samardak
Team Co-Ordinator
/sc

When writing the Board please quote the above file number

942 Reytan Blvd.,
Bay Ridges,
Pickering, Ont.
L1W 1Y7

March 6, 1981.

Miss Linda Kahn,
Executive Co-ordinator,
Royal Commission on Matters of Health,
180 Dundas Street West,
22nd Floor,
TORONTO, Ont. M5G 1Z8.

Ack. Mar 9/81

Dear Miss Kahn:

Thank you for your notes acknowledging my briefs.

Enclosed is a copy of the Pathology Report. You will see that it differs considerably from the findings in the W.C.B. report.

On February 27th, 1981 I sent a letter to the Workmen's Compensation requesting an appeal and requesting a summary of information related to their decision.

I trust this will enlighten the Commission a little more on some of the problems being experienced by people like myself regarding occupational asbestos lung disease with the W.C.B.

Thank you again for your interest and concern.

Sincerely yours,

Doug Wray

Doug Wray

Telephone No. 839-1076

DW/nw

Encl. 1

Registered Mail

...ERING GENERAL HOSPITAL

AJAX, ONTARIO

DEPARTMENT OF PATHOLOGY

PATHOLOGY REPORT

WRAY MR DOUGLAS 80 5304
746 WEYTRNO BLVD BR PICKERING
83 1076 M N PROT 20 7 33 46
RE
NAVIS WRAY WIFE SAME
82341131 33 D 4 3 80

CAS. NO. S-512-80
213

AGE

DATE March 10th, 19

...NCHCSCOPY AND MEDIASTINOS

...EON 83 1 01

WARD 213

...E pleural left lung - quick section.

HOSP. NO. 80 5304

...S DESCRIPTION:

Submitted for quick section from the pericardium is a segment of thickened whitish, pericardial tissue which measures 5 cms., in greatest dimension.
Quick section diagnosis - fibrous plaque, consistent with exxposure to asbestos.

The second specimen from the same patient consists of two irregular fragments of pleura, which bear thick whitish fibrous plaques, the larger of which measures 10 cm., in greatest dimension.
Quick section diagnosis - benign fibrous plaqse, consistent with exxposure to asbestos.

The third specimen from the same patient is from the left side and consists of similar paricardial tissue, the larger of the two fragments measuring 4 cms., in greatest dimensi...
Representative sections are labelled #3.

The fourth specimen is from the lower lobe of the left lung and consists of a wedge shaped segment of congested lung tissue, which measures 5 cms., in greatest dimension.
Representative sections are labelled 4.

The fifth specimen is labelled 5. It is a biopsy of the left anterior mediastinum and condists of two pigmented lymphnodes, each of which measures 1 cm., in greatest dimensio...
They are entirely embedded.

The sixth specimen from the same patient is a biopsy of the posterior intercostal space and consists of two irregular fragments of pleural tissue which have thick fibrous plaqu... similar to those previously described.

...SCOPIC DESCRIPTION

Sections from pleura and pericardium, show similar histology. There are dense fibrous plaques. In some areas they are completely acellular. In others the fibrous tissue is "looser" and there is infiltration with histiocytes, lymphocytes and plasma cells, as well as capillary blood vessel proliferation. These plaques are typical of the fibrous plaques seen in persons exposed to asbestos fibres.
The lung tissue shows ataloctasis, fibrosis and focal collections of iron pigment, in whic... a considerable number of asbestos fibres is identified. The lymph nodes show preservation of architecture and mild reactive hyperplasia.

MICROSCOPIC DIAGNOSIS

PLEURA AND PERICARDIUM	-	FIBROUS PLAQUES
LYMPH NODES	-	REACTIVE LYMPHADENITIS
LUNG BIOPSY	-	ATELECTASIS
	-	FIBROSIS
	-	ASBESTOSIS

DM Cass md
PATHOLOGIST

REV. 75

SURGEON

2 Bloor Street East
Toronto, Ontario
M4W 3C3
Telephone (416) 965-8915

The Workmen's Compensation Board

March 13, 1981

Mr. Douglas Wray
942 Reytan Blvd
BAYRIDGES, Ontario
L1W 1Y7

Dear Mr. Wray:

Claim S12564241

The information you have requested is enclosed.

Following your review of this information and should you wish to proceed with an appeal, you should ensure that you have the information in your case fully prepared before requesting an appeal Hearing date. This is important as postponements of scheduled appeal Hearing dates are not usually allowed.

A Hearing date will not be set until we receive confirmation that you are ready to proceed with the appeal. Please write to the Registrar of Appeals, Workmen's Compensation Board, 2 Bloor Street East, Toronto, Ontario, M4W 3C3. A Hearing date will then be arranged.

Yours very truly

Mrs. M. LeBannister

Supervisor
Appeals Services

encl.

*mc

When writing the Board please quote the above file number

SUMMARY OF INFORMATION

Claim S12564241 - Douglas Wray

ISSUE:

Mr. Douglas Wray is claiming that his lung disability is related to his exposure to asbestos while employed with Ontario Hydro.

DIAGNOSIS:

Non-entitlement -

Acute bronchopneumonia and collapse of the left lower lobe.

March 10, 1980, thoracotomy and pleurectomy, anterior, apical and posterior.

HISTORY:

In June, 1980 a claim was established for Mr. Douglas Wray, age 46 and employed with Ontario Hydro since January, 1964 for chest disability. Information was received from Ontario Hydro indicating that Mr. Wray was recovering from a thoracotomy and pleurectomy as treatment for extensive pleural thickening. There had been a history of occupational exposure to asbestos and it was felt that these particular surgical interventions were necessary because of Mr. Wray's exposure to asbestos.

Initially his disability was diagnosed as acute bronchopneumonia which did not resolve and he suffered a collapse of the left lung. Due to a suspected carcinoma further tests were carried out by way of a thoracotomy and pleurectomy on March 10th, 1980. The results of the biopsy showed no evidence of any malignancy.

Mr. Wray was reviewed by the Advisory Committee in October, 1980 and they indicated an absence of any asbestosis. A pathology specialist was then asked to review the tissue and also concluded that there was no evidence that asbestos exposure had damaged Mr. Wray's lungs. Fibrosis of the kind seen in asbestosis was not present.

The Chief Consultant in industrial diseases reviewed the information on file and expressed the opinion that Mr. Wray was not suffering from any compensable disorder which could be related to his exposure to asbestos while

-continued-

employed with Ontario Hydro. On February 17th, 1981, the Claims Review Branch concluded that there was no evidence to support that Mr. Wray was suffering from any work related disability and in particular, asbestosis and therefore ther was no entitlement for payment of medical aid or compensation benefits as it was not established that the disability arose out of the employment.

DOCUMENTS:

1. Information from Consultant in Industrial Diseases, June, 1980:

The Consultant directed that the Records Department open a claim for asbestosis for Mr. Douglas Wray.

2. Report of Internist, February, 1980:

The specialist stated that Mr. Wray had a persistent cough since the early part of December, 1979 and had been on two separate courses of antibiotics without any clearing of his lung field. Mr. Wray described a tightness across his chest which appeared to be worse with deep breathing. A chest x-ray did show pneumonic consolidation. He had had occasional phlegm production which was whitish in colour and he had not had any hemoptysis.

On physical examination there was no jugular venous distention. Funduscopic examination was normal. There was no cervical or axillary lymphadenopathy noted. On auscultation of the chest bronchial breathing was noted over the posterior basal segments of the left lower lung field. No murmurs were noted. Liver and spleen were not palpable. There were no localizing neurological signs and the plantar response were laterally downgoing.

It was felt he had acute bronchopneumonia in th left lower lung field which seemed to be cleari clinically. A repeat chest x-ray would be done and this would be sent under separate cover to the physician. If the pneumonic consolidation was still predominant then he should have a bronchoscopy performed to make sure there was no obstructive lesion leading to the bronchus to the left lower lung field. Thi could be done as an out-patient in the hospital

-continued-

3. Report of Consultant, March, 1980:

Mr. Wray presented with a complaint of cough, some chest pain and a history of contracting pneumonia in December following which he was noted to have a collapse of his left lower lobe which had remained collapsed.

On examination there was dullness over the entire posterior aspect of the left chest and there was decreased almost absent breath sounds in the base of the left chest. Review of the chest x-ray showed what appeared to be a pneumonitis involving the left lower lobe and persistent collapse since that time.

The opinion was that he had obstructing lesion causing collapse of his lower lobe. It was recommended that he undergo a bronchoscopy and mediastinoscopy as soon as possible.

4. Report of Pathologist, March, 1980:

Six specimens were submitted for study to the pathologist.

Sections from pleura and pericardium showed dense fibrous plaques. In some areas they were completely acellular. In others the fibruous tissue was looser and there was infiltration with histiocytes, lymphocytes and plasma cells as well as capillary blood vessel proliferation. These plaques were typical of the fibrous plaques seen in persons exposed to asbestos fibres. The lung tissue showed atalectasis, fibrous and focal collections of iron pigment in which a considerable number of asbestos fibres were identified. The lymph nodes showed preservation of the architecture and mild reactive hyperplasia.

5. Report of Company Physician, June, 1980:

The physician stated he was submitting a claim on behalf of Mr. Wray and was enclosing a copy of a recent file memo. Mr. Wray was currently recovering from thoracotomy and pleurectomy as treatment for extensive pleural thickening. He had a history of occupational exposure to asbestos and had been followed by the Industrial Chest Disease Service Surveillance programme of Ontario Hydro workers who had in the past been exposed to asbestos fibres.

-continued-

The physician stated that in 1949 Mr. Wray left school at age 16 and then did farming up intil 1952. From 1952 to 1953 he was working in construction as a labourer on an industrial site. From 1952 to 1964 he worked at a car dealership and in 1964 he joined Ontario Hydro at the R.L. Hearn generating station as a craftsman helper. In 1974 he became an apprentice welder at the same generating station Mr. Wray had advised the physician that in his job as craftsman helper he was involved in broiler maintenance and stripping of asbestos lagging from the boiler and steam pipes.

The physician stated he visited Mr. Wray at his home. Examination of the chest revealed unequal expansion with deminished chest movement on the left. There was a left thoractomy scar. On auscultation breath sounds were diminished on the left from the area of the operative incision down to the lung base. There was some tenderness along the left costal margin and in the left upper quadrant. His blood pressure was 160 over 90 in the right arm when he was supine. His heart rate was 88 per minute and the rhythm regular.

The diagnosis was extensive thickening of the lung pleura requiring pleurectomy in a man with occupational history of asbestos exposure. The diagnosis presented by the treating surgeon was pleural asbestosis.

The physician stated Mr. Wray was still in a post-operative recovery. He would like to see him before he returned to work. He anticipated there would be some exertion or limitations placed on him when he returned to work.

6. Report of Company Physician, June, 1980:

The physician stated Mr. Wray had been employed by Ontario Hydro as a craftsman helper, a welder and a mechanical maintainer from January 20th, 1964 to the present. During this period he was regularly involved in boiler maintenance and the removal of asbestos boiler skin casings. In addition he had worked regularly on steam piping repairs and removed asbestos lagging.

Exact exposures were difficult to estimate. However, he was exposed to asbestos, Crysotile and perhaps Amosite, on a regular basis throughout his years of employment with

-continued-

Ontario Hydro.

Asbestos work procedures began to change in the early 1970's at Ontario Hydro to minimize exposure.

7. Employer's Report of Occupational Disease, July, 1980:

The employer stated that from January 20th, 1964 to December 14th, 1972 Mr. Wray was a craftsman helper, from December 14th, 1972 to October 17th, 1974 a welder, from October 17th, 1974 to October 28th, 1975 a C.M. trainee, from October 28th, 1975 to October 28th, 1977 a S.M. 11 from October 28th, 1977 to the present S.M. 1. All the work took place at the R.L. Hearn generating station.

8. Opinion of Chest Disease Consultant, August, 198(

It was stated that the medical reports indicated Mr. Wray had investigation for a consolidation or collapse of the lung. Mediastinoscopy, bronchoscopy were negative. He then had a thoracotomy. The pathological tissue showed fibrous plaques of the pleura and pericardium, reactive lymphadenitis of the lymph nodes and the lung biopsy showed atelectasis fibrosis and asbestos fibres.

Before listing the claim for examination by the Advisory Committee it was felt that information should be obtained from Mr. Wray and his employer as to whether he was exposed to asbestc in his work place, for how long and to what extent.

9. Information from Mr. Wray, August, 1980:

Mr. Wray claimed he was exposed to asbestos for a few days a week while repairing boilers. In the early days they handled blocks that were asbestos and in subsequent years they had been using a powder substance which also contained asbestos.

Mr. Wray stated that the maintenance supervisor and two workers could support his statement.

-continued-

10. Report of Advisory Committee on Occupational Chest Diseases, October, 1980:

The report stated Mr. Wray was examined October 9th, 1980. He complained of breathlessness on hurrying, daily morning cough with scanty yellow-white stringy sputum. There was no hemoptysis or wheeze. There was tenderness in the left nipple area with needle like pains. He was generally tired. A hacky cough developed last fall followed by shortness of breath and pain in the left posterior chest. The family physician treated him for pneumonia but since there was no change on the chest x-ray he was seen and further investigated by an internist.

On physical examination there was marked reflective error on fundi examination. Other general examination was normal. There was a scar in the left axilla. There were no abnormal auscultaroy sounds but there was a flat percussion noted with depressed breath sounds in the left posterior base.

Survey films were available from 1968 to 1978 and had been reported normal. A March, 1980 film from the hospital showed pleural thickening and effusion in the left lower chest with some decrease in effusion and pleural markings by October 9, 1980 but with a continuing elevation of the left hemi-diaphragm. A review of the March, 1975 and earlier films failed to show pleural thickening anywhere.

Mediastinal node biopsy report from March 6th, 1980 indicated carbon pigment in the reactive lymph nodes but no evidence of malignancy. The diagnosis was reactive lymphodenitis.

Resting tests were within normal limits. The exercise test showed ventilatory and cardiac responses within normal limits although the minute ventilation and repsiratory frequency were at the upper border of reference values. There was no oxyhemoglobin desaturation during exercises. General fatigue was stated as a limiting complaint during work.

There was no absestosis but pleural plaques and pleural thickening. It was recommended he be re-examined in one year.

-continued-

11. Opinion of Consultant in Industrial Diseases, December, 1980:

The Consultant stated he reviewed all the medical evidence and more than one document tried to leave the impression that the surgery was performed because of suspected asbeostos effects. It was clear that the surgery followed, and was a result of, some consolidation of the left lower lobe which was diagnosed as an acute bronchopneumonia. This did not appear to resolve there appeared to be collapse of the left lower lobe. The attending physician suspected a cancer. He also reported no pleural thickening of such could be seen only minimally without any definite calcification. It was clear therefore that the operation was performed not to primarily release or strip pleura. One of the specialists had noted that there was no obvious pleural thickening on the x-ray prior to the operation. The findings at thoracotomy in other words represented but not infrequent changes found many insulators who had been exposed to asbestos, i.e., pleural plaques, pleural thickening, but no asbestosis. These findings of themselves did not justify a thoracotomy.

The Consultant stated he would like the Chief Pathologist to review all the tissue here. The reports on the tissue from the local pathologist were incomplete and too scanty to be of much value.

12. Report of Chief Pathologist, January, 1981:

The Pathologist stated that he received 12 slides stained with haematoxylin and eosin and fragment of pleural tissue and of a lung biopsy. The tissue was identified as coming from the left lower lobe, the left pleura, the pericardium and the mediastinum. The findings were of pleural plaques which were old and cellular and recent organizing with overlying fibrin that was marked. There was also pericardial plaque which was recent organizing with overlying fibrin and marked. It was stated that the findings must be interpreted with caution. A biopsy was necessarily small and might not be representative of the tissue sampled. This was particularly so in a biopsy of a lung for the biopsy must necessarily be taken from the subpleural region and may not reflect the state of the anterior of the lungs.

-continued-

The pathologist stated that he did not have an account of the operative findings or x-ray reports to indicate the appearance and extent of the serosal plaques. He noted that Mr. Wray did have a pleural effusion but did not know if there was widespread deposition of fibrin on the pleura, or if the fibrin was evident only on the plaques. He had retained unusually large numbers of asbestos bodies in his lung. Even a few hundred asbestos bodies in a 5 gram sample of lung indicated heavy exposure to asbestos and Mr. Wray had 16,500 in such a sample. There could be no doubt that he had been heavily exposed to asbestos. There was no evidence that this exposure had damaged his lungs. Fibrosis of the sort seen in asbestosis was not present.

The pleural plaques consisting of coarse, acellular collagen were typical of asbestos disease. In view of Mr. Wray's heavy exposure to asbestos, they probably were caused by asbestos although such plaques could be a residue of infection or be caused in other ways. Such plaques were not known to cause disfunctior

The cellular plaques were not typical of asbest(disease. They could be caused by any severe local or generalized fibrinous pleurisy. Asbes could cause pleurisy and pleural thickening cou follow and so Mr. Wray's pleurisy and cellular plaques could be due to asbestos but other causes of the pleurisy was possible.

It was not known that pericardial plaques were on the pulmonary side of the pericardium and associated with Mr. Wray's pleurisy or if they were on the cardiac side and he had also pericarditis. The cellular plaques were very active. They would probably mature into quiescent plaques but it would be well to follow their evolution to ensure that progressi disease was not overlooked.

The anthracosis was slight and of no functional importance. The mediastinal lymphnode biopsy showed no significant abnormality. Thus Mr. Wray showed clear evidence of marked exposure to asbestos. The biopsy did not show asbestosis or any other significant fibrosis of the parenchyma of the lung. Mr. Wray had typical asbestos plaques. He also had organizing plaques not typical of his asbestos disease, possibly secondary to

-continued-

asbestos-induced pleurisy, possible due to some other cause.

13. <u>Opinion of Consultant in Industrial Diseases, February, 1981</u>:

The Consultant stated that the chief pathologist had confirmed the impression that there was no asbestosis present. The attending surgeon noted to himself that there was no obvious pleural thickening on the x-ray prior to the operation and the operation was undertaken in order to resolve a diagnostic problem, i.e. the possibility of cancer. Cancer was not present nor was asbestosis present.

The Consultant stated it was his understanding that in the past where an operation was performed for a diagnosis and the diagnosis confirmed the necessity for the operation because of some compensable change, then the Board would be responsible. In this case the diagnosis did not support the need for an operation although the biopsy showed evidence of pleural plaques which were not infrequently seen in those who were exposed to asbestos.

The impression was that a pneumonia could be accompanied by pleuritis and the pleuritis found in this operation could have been due to inflammation and not a reactive pleuritis due to asbestos exposure. On the other hand as the chief pathologist stated the recent pleuritis might have been a reactive pleuritis from the presence of asbestosis fibres if this had been left along it might have resolved on its own. Mr. Wray was still not back to regular work despite the fact that the Advisory Committee in October, 1980 found that he had no impairment.

It was not possible to recommend that the Board accept responsibility for this claim as it now stood. The prolonged lay off seemed to have no organic basis. The consultant supposed, with no little benefit of doubt, some thought could be given to covering the time in hospital and a suitable convalescent period. This was said with some reservation because he was reluctant to suggest responsibility being taken in a claim involving an operation that was quite likely in the future to make the man worse than he was before and when the findings at operation failed to disclose

-continued-

significant asbestos induced pathology which in isolation would not justify such a procedure.

Claims Review Branch Decision, February, 1981:

The Review Branch concluded there was no evidence to support that Mr. Wray was suffering from any work related disability and in particular, asbestosis and under the circumstances they were unable to accept entitlement for payment of medical aid or compensation benefits.

BENEFITS:

Nil.

M. Van Den Hoogen | [illegible]

Mrs. M. Van Den Hoogen*jab
Appeals Administrator
March 12th, 1981

52

February 18, 1981

Dear Miss Kahn:

Having attended two days of Royal Commission meetings concerning the use of asbestos, I noticed that the Commission was interested in Compensation cases involving asbestos.

I am therefore sending a copy of a compensation case which we have in our plant which was rejected by the Compensation Board.

Trusting that this will be of some value to the Royal Commission in their study concerning asbestos.

Yours truly,

D.W. Bishop
192 Crocus Drive
Scarborough, Ontario
M1R 4T7

2 Bloor Street East
Toronto, Ontario
M4W 3C3
Telephone (416) 9658915

The Workmen's Compensation Board

Mr. D. Bishop
192 Crocus Drive
Scarborough, Ontario
M1R 4T7

October 15, 1980

Dear Mr. Bishop

Claim S12564239 - J. Wilks

The information you have requested is enclosed.

Following your review of this information and should you wish to proceed with an appeal, you should ensure that you have the information in your case fully prepared before requesting an appeal Hearing date. This is important as postponements of scheduled appeal Hearing dates are not usually allowed.

A Hearing date will not be set until we receive confirmation that you are ready to proceed with the appeal. Please write to the Registrar of Appeals, Workmen's Compensation Board, 2 Bloor Street East, Toronto, Ontario, M4W 3C3. A Hearing date will then be arranged.

Yours very truly

M LeBannister

rs. M. LeBannister

ncl.

Supervisor
Appeals Services

ıen writing the Board please quote the above file number

SUMMARY OF INFORMATION

Claim S12564239 - John A. Wilks

Issue:

Mr. Wilks is claiming entitlement to asbestosis. He has claimed that this condition arose out of and in the course of his employment with Ontario Hydro.

Diagnosis:

Non-Entitlement:

1. Obstructive lung disease.

2. Asbestosis (questionable).

3. Coronary heart disease.

History:

In June, 1980, Mr. Wilks submitted a claim for asbestosis. He attributed the development of this condition to his employment with Ontario Hydro since January, 1951. To clarify if entitlement was warranted, information regarding Mr. Wilks' employment with Ontario Hydro was obtained. It was found that between 1951 and 1962 Mr. Wilks was employed as a security guard. From 1962 to 1970 he was employed as a craftsman's helper and at the Hearn Generating Station and from 1970 to the present was employed as a fitter at the Hearn Generating Station.

In addition a detailed medical report was submitted by the company doctor outlining Mr. Wilks' previous occupational history, his diagnosis, and results of x-rays and pulmonary function tests. The conditions diagnosed were coronary artery disease which was controlled medically, obstructive lung disease and plural plaques with minimal parenchymal and a history of asbestos exposure.

The medical information was reviewed by the Board's Consultant in Chest Disease. He noted that the x-rays showed fibrotic parenchymal and plural changes beginning in 1971 which were suggestive of exposure to asbestos. The doctor felt there was non-sufficient evidence to warrant listing the claim for examination at the time and recommended the claim for asbestosis be denied. This decision was confirmed by the Claims Review Branch on August 25, 1980.

Mr. Wilks has now appealed this decision.

Documents:

1. Radiologist's Report, June, 1980.

The x-rays revealed evolutionary changes in fibrotic parenchymal and pleural residuals beginnin in 1971. Pleural plaque formation was seen at the left lateral chest wall slightly advanced since 1974. A history of asbestos exposure was noted but this fact did not necessarily imply a causal relationship to the radiographic findings.

Pulmonary function tests were within normal limits.

2. Company Doctor's Letter, June, 1980.

The letter stated that the company doctor was submitting a claim for asbestosis on behalf of Mr. John Wilks. The doctor stated that the chest x-ray findings were suggestive of asbestosis exposure and in addition he had mild two moderate obstructive lung disease.

3. Company Doctor's Report, June, 1980.

The doctor stated that Mr. Wilkds was on the Chest Disease Surveillance Program because of presumed previous asbestos exposure. The doctor noted that recent chest x-rays showed a shadow on the lung however tomograms were normal. The doctor pointed out that in 1978 the Industrial Chest Disease Services had reported that there was evolutionary changes in fibrotic parenchymal and pleural residuals beginning in 1970 and that there were pleural plaque formations on the left lateral chest wall slightly advanced since 1974. The family doctor had been contacted who had taken numerous chest x-rays. The family doctor felt there had been minimal change over the past ten years.

Mr. Wilks reports no specific respiratory system complaints. He smoked approximately half a pack of cigarettes a day having done so since his teen years. He had athrosclerotic heart disease which was diagnosed in 1976 and controlled by medication.

The occupational history was reviewed and it was noted that at age 14 he began working in a bake shop. He joined the army at age 19 in the capacity of a cook. At age 23 he returned to the bake shop. At age 26 he was employed as a driver and at age

27 began working for Ontario Hydro in security. At age 38 he joined the Hearn Generating Station as a craftsman. He felt he had been exposed to asbestos off and on when he had helped strip asbestos off pipings, boilers, and helping the lagger.

The doctor diagnosed coronary artery disease that was controlled medically. He also diagnosed obstructive lung disease which was mild to moderate and pleural plaques with minimal parenchymal involvement and history of asbestos exposure.

The doctor outlined that he discussed the results of his testing with Mr. Wilks and advised him that in his opinion the obstructive lung disease was probably due to cigarette smoking and that the pleural plaques and minimal parenchymal involvement produced no significant changes in pulmonary function. He advised him he would present his case to the Compensation Board for consideration.

4. <u>Injured Employee's Report of Occupational Disease, July, 1980.</u>

The report stated that Mr. Wilks was 56, employed as a mechanic fitter for Ontario Hydro was submitting a claim for occupational disease. He outlined that he had worked with Ontario Hydro from January 16, 1951 to date.

5. <u>Employer's Report of Occupational Disease, July, 1980.</u>

The report confirmed Mr. Wilks' periods of employment. The report showed that from January 16, 1951 to May 2, 1962 he was employed as a security guard in the Central Region. From May 2, 1962 to October 29, 1970 he was employed as a craftsman helper at the Hearn Generating Station. From October 29, 1970 to the present time he was employed with Ontario Hydro as a fitter at the Hearn Generating Station.

6. Chest Disease Specialist's Opinion, August, 1980.

The doctor reviewed the medical information submit along with the x-rays. He noted the x-rays showed fibrotic parenchymal and pleural changes beginning in 1970 suggestive of exposure to asbestosis. Pulmonary function tests were within normal limits The doctor noted he had coronary heart disease and obstructive lung disease. He felt there was insufficient evidence to warrant listing Mr. Wilks for examination at the present time and recommende that the claim be denied for asbestosis.

Claims Review Branch Decision, August, 1980.

The Review Branch noted that the matter of a relationship between the asbestosis condition and any other chest disease had been reviewed by one of the Board's Industrial Medicine Consultants. The opinion had been expressed that there was no relationshi between Mr. Wilks' asbestosis or any other chest disability and his employment exposure.

In view of the medical opinion expressed, the Review Branch concluded that Mr. Wilk's chest condition had not been shown to be related to his employment exposure. Therefore the claim for benefits must be denied.

F Medland

Mrs. F. Medland
Appeals Administrator "B"
October 14th, 1980

FM:cm

ontario hydro
research division

Mr. H. Makuch
Superintendent
Chemical, Fuels & Environment
R.L. Hearn GS

Sample No 80-1130

INSULATION FROM UNIT #4 R.L. HEARN GS

Two samples of thermal insulation were analyzed qualitatively for asbestos by microscopic and XRD methods. The results obtained are detailed below:

Sample	Asbestos Type	Est Conc, g/kg
#1 LP Inner	Chrysotile	210
#2 LP Outer	Chrysotile	710

Approved:

for O.T. Melo
Supervising Engineer
Analytic Services Section
Chemical Research Dept

Submitted:

B. Pattenden

B. Pattenden
Technician
Analytic Services Section

BP:il

DISTRIBUTION

Mr. H. Makuch	R.L. Hearn GS
Mr. J.C. To	CSS, Pickering
Mrs. S. Vekris	Chemical Research
Mr. R.L. Hart	Chemical Research
Mr. B. Pattenden	Chemical Research

Official Record

job	file	date	report no
740633-233-538	833.71	September 16, 1980	CS80-1241-K

ontario hydro
research division

To Mr. H. Makuch
Superintendent
Chemical, Fuels & Environment
R.L. Hearn GS
ATTN: MR. W. WRIGHT

Sample No 80-880

INSULATION FROM UNIT #8 R.L. HEARN GS

Six samples of insulation were analyzed qualitatively for asbestos by microscopic and XRD methods. The results obtained are detailed below:

Sample	Asbestos Type	Estimated Concentration g/kg
#1, Reheat line to turbine	Amosite	450
#7, IP2 to LP west	Amosite	160
	Chrysotile	270
#12, ID fan ducts	Chrysotile	350
#13, boiler wall insulation 325 foot level	Chrysotile	140
#17, water feed pump discharge	Amosite	780
#21, 1st pt heater	Crocidotile	580

Approved:

O.J. Melo

O.T. Melo
Supervising Engineer
Analytic Services Section
Chemical Research Dept

Submitted:

B. Pattenden

B. Pattenden
Technician
Analytic Services Section

BP:il

DISTRIBUTION

Mr. H. Makuch	R.L. Hearn GS
Mr. J.C. To	CSS, 757 McKay Road, Pickering
Mr. W. Wright	R.L. Hearn GS
Mrs. S. Vekris	Chemical Research
~~Mr. R.L. Hart~~	~~Chemical Research~~
Mr. B. Pattenden	Chemical Research
Official Record	

job	file	date	report no.
740633-233-538	833.71	August 26, 1980	CS80-1150-K

53

Provincial Building & Construction

Trades Council of Ontario

15 GERVAIS DRIVE, SUITE 604, DON MILLS, ONT. M3C 1Y8 (416) 449-4830

February 25th, 1981.

Linda Kahn, M. P. A.,
Executive Co-ordinator,
Royal Commission on Matters of Health
and Safety Arising from the Use of
Asbestos in Ontario,
180 Dundas Street, West,
22nd Floor,
Toronto, Ontario.
M5G 1Z8

Dear Ms. Kahn:

Enclosed please find the Brief our Council is submitting on The Royal Commission on Matters of Health and Safety Arising From The Use Of Asbestos In Ontario.

With best wishes, I remain,

Sincerely yours,

J Duffy

JOSEPH DUFFY
SECRETARY-TREASURER

JD/bh
Encl.
opeiu/343

B R I E F

SUBMITTED TO

THE ROYAL COMMISSION ON MATTER OF HEALTH AND SAFETY
ARISING FROM THE USE OF ASBESTOS IN ONTARIO

BY

PROVINCIAL BUILDING AND CONSTRUCTION TRADES COUNCIL OF ONTARIO

SUBMITTED TO: THE ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY ARISING FROM THE USE OF ASBESTOS IN ONTARIO

We, the Provincial Building and Construction Trades Council of Ontario, respectfully submit the following Brief:

The Provincial Building and Construction Trades Council of Ontario as part of the Labour Management Safety Committee, have gone on record as giving full support to the Brief presented on behalf of the Construction Safety Association of Ontario.

On January 1st, 1981 I became the Secretary-Treasurer of the Provincial Building and Construction Trades Council of Ontario. Over my years of working on construction sites, I have watched my fellow members of Local 95 work with asbestos not knowing that in a short time I would be going to their funerals.

Over the last twenty five years I have been an asbestos worker, a member of Local 95 of the International Association of Heat and Frost Insulators and Asbestos Workers Union, starting in 1956 on the St. Michael's Hospital new laundry and numberous other construction sites. O'Keefe Centre, Toronto-Dominion Centre, Western Hospital, Sick Children's Hospital, Toronto General Hospital, East General Hospital, North York Hospital, Grace Hospital and many others. I have also worked on more schools than I can remember. All of these sites have asbestos material on either the heating pipes or on the boilers and furnaces.

We believe that we are now seeing the results of bad work habits and poor planning in the construction industry where asbestos has been used as an insulation material for many years. This practice is not as common now. There are still a few products with asbestos bases, floor tile, drywall and caulking compounds and asbestos pipes.

As to the problem of identification of asbestos material, I would like to say that in my twenty five years working on construction sites both in Canada and in the United States of America, there was not one new construction job that did not have asbestos material in it.

Therefore the Provincial Building and Construction Trades Council of Ontario recommends to the Ministry of Labour the setting up of a proper procedure in the removal of asbestos which will provide a practical and effective standard of protection.

I could set down a set of regulations but this is well looked after in the Briefs by the Construction Safety Association and Iron Workers Local 721.

opeiu/343

2517 Wilhaven Drive,
Cumberland, Ontario,
KOA1SO

Linda Kahn,
Executive Co-ordinator,
Royal Commission on Asbestos,
180 Dundas Street West, 22nd floor,
Toronto, Ontario M5G 1Z8

March 2, 1981

54

Dear Ms Kahn,

I would like to add the following information to the Commission, as it has bothered me ever since press reports began detailing health problems related to asbestos, several years ago.

I am now nearly 36 years old. When I was between 7 and ten years of age, in public school in Toronto, we used to make things out of asbestos powder, in art class. We made ash trays, animals, figurines and other "sculpture".

I still remeber seeing the cloud of raw asbestos dust rising up in front of me as the teacher poured the material out of a big bag or carton onto a work table. We would then plunge our hands into it and slide a certain amount of the pile toward each of us, for mixing with water. When the dust formed a mass like putty, it was worked until it was the proper consistency to be shaped into objects, then it was baked into a hard object in a kiln. We enjoyed doing this so much that we used to go the hardware store after school and buy this powder in bulk, in order to make things at home on our own time. I know a number of other children who did the same thing, particularly others on my street. At that time asbestos was only a few cents a pound, and you could buy a lot of it for about 50¢.

There was no control over its purchase or use, no warnings given either at school, at the store where we bought it, or at home from our parents. Everybody breathed in the dust, and I imagine we ingested a fair amount in when we ate, if we did not thoroughly wash our hands after working with it, and before meals. I remember it adhering to my hands, and embedding itself under my fingernails. It might take a day or two to completely work its way out from under the nails and pores. It also adhered to the sleeves of our shirts and sweaters.

I don't know how many children were exposed to this material in the same way we were, over the years. Maybe until recently, schools were still using it as an artists medium, then stopped when the bad publicity became widespread. I know, however, that for the last 10 years I have had a cough that nobody seems to be able to pin down as to cause. I do not smoke, have asthma or emphysema. I am not subject to colds very often, have no known allergies or bronchitis. I often wonder whether that early exposure to asbestos in concentrated form, with clouds of dust swirling around within inches of my nose, predisposed me to this cough that I am unable to shake off. Whether other children who shared the experience with my generation of budding artists, grew up to have the same symptoms I do not know, but I think it worth looking into further.

Sincerely yours,

Bruce B. Koffler, BSc., M.C.A.

55

ack. Mar 9/81

March 5th, 1981

TO THE MEMBERS OF THE ROYAL COMMISSION ON ASBESTOS

My husband, Harold Shorting, began working at Canadian Johns-Manville in February 1948. He had a training period at the Johns-Manville plant in Newark, New Jersey before the Canadian plant opened at Port Union in April of that year.

During the thirty years he worked at Johns-Manville, he was in turn machine tender, foreman and lift truck operator.

He never smoked and seldom took a drink. He was a strong, healthy man who was accustomed to physical activity and who tried to preserve his health.

For many years he did not breathe properly. He never breathed deeply as I do, but with quick, shallow breaths, much like the breathing of a baby. There was always the sound of a wheeze or low whistle in his chest. During the year before his death, he was having increasing difficulty breathing, but he kept as active as his condition allowed because he felt it was best for him. Neither of us realized that his illness was of an immediate critical nature, but thought of it as a chronic disease that had to be lived with. He died suddenly on March 26th, 1978, five days before his fifty-sixth birthday and thirty years after he began working at Johns-Manville.

At the time of his death, he was in receipt of a pension for 15% partial disability because of asbestosis. The pension amounted to $142.00 a month. I must add that he was also working at Johns-Manville at the time. I was refused compensation because the compensible disability was not the direct cause of his death. I am enclosing a copy of a letter I received from Dr. Pflug who attended my husband at the time of his death. This letter was written before the results of the autopsy were revealed. No other doctor would say that my husband's death was the result of exposure to asbestos. Recently, I heard the doctor for Johns-Manville tell the members of the Royal Commission on Asbestos that, no, he did not believe that asbestos causes heart attacks. I suggest that just maybe, if that doctor had breathed for, say, fifteen years, the way my husband breathed, he might feel differently. An interesting experiment that I have tried is to breathe with quick, shallow breaths for a few minutes, even, and see what it does to a person.

.../2

I am enclosing a copy of the autopsy report which certainly shows that my husband's body contained much evidence of asbestos fibres.

It amazes me that any employers in this day and age can get away with allowing such working conditions that men's bodies are damaged, and then can wash their hands of the whole situation. Neither the company nor the Compensation Board assumes any responsibility for my husband's condition. I am not only speaking for him, but for others in the same situation who are not living to speak for themselves.

When Canadian Johns-Manville opened in 1948, little did any of the new employees realize the grief and pain that would be caused in this area in twenty-five or thirty years hence.

If the Royal Commission does nothing else, I hope that somehow it can help to prevent a tragedy like this ever happening again.

Statistics are statistics until they hit home. Then they are something else.

Sincerely yours,

Marjorie Shorting

/ms
encls.

(Mrs.) Marjorie Shorting
41 Shorting Road
Agincourt, Ontario
M1S 3V3

TELEPHONE 282-0326

MICHAEL PFLUG M.D., F.R.C.P. (C)

2850 ELLESMERE ROAD
CENTENARY PLAZA
WEST HILL, ONTARIO
M1E 4B8

May 3, 1978

Mrs. Shorting,

Dear Mrs. Shorting,

I think I talked to you shortly after the sudden death of your husband at the Centenary Hospital. He died of pulmonary edema, a form of a cardiac failure.

I am just completing the death certificate under the Workmen's Compensation Act in Ontario.

I mentioned there, and I want to state here, that I think that there is a connection between the sudden death, even though it was of a cardiac origin, and the underlying asbestosis. In other words, in my opinion, I think this could be supported by other medical opinion if necessary, this man's pulmonary edema which was very rapidly fatal, was much more serious because of the underlying condition of asbestosis. Heart failure itself is of course also ~~of-no~~ one of the consequences of chronic lung disease such as asbestosis.

[illegible]

While I wouldn't necessarily want you to use this present letter in support of any claims you may have, I think you have a right to ask for a review of the Association of asbestosis and his death. In my opinion there was a direct connection.

Yours sincerely,

Michael Pflug, M.D.

MP/jb

The Coroners Act – Province of Ontario

REPORT OF POST MORTEM EXAMINATION

A-19

(1) Made upon the body of HAROLD SHORTING, 41 Shorting Road, Agincourt

at Scarborough Centenary Hospital in the County

of York in the Province of Ontario, on the 27th

day of March 19 78, about 14 1/2 hours after death.

(2) Place of death: Scarborough Centenary Hospital

(3) Time examination commenced 1430 hours

(4) Required by coroner, Dr. F. Demanuele

IDENTIFICATION:

The body was identified to me by John LaLonde, 61 Shorting Road, Agincourt, (Brother-in-law)

in the presence of -

(1) EXTERNAL EXAMINATION:

Description of the body.

Length 5' 11" Weight Est.190 lbs Sex M Temperature -

Apparent Age 55 Hair reddish, bald Eyes blue

Pupils equal, medium How nourished well

Skin (cyanosis, scars, etc.) Tattoo left forearm - appears to be a flower, right inguinal hernia scar.

Rigor Mortis marked

Post Mortem staining marked on back

Decomposition nil

Clothing and effects none

(2) EXTERNAL MARKS OF VIOLENCE: nil

thickened parietal pleura by white firm plaques, 1/2 cm. thick.

Pericardium normal

Mediastinum Many enlarged nodes matted together, firm white flecks in nodes.

(b) Face and Neck

Mouth some food particles Nose normal

Pharynx some food particles Tongue normal

Hyoid Bone normal

Thymus (weight) atrophied

Thyroid (weight) normal

(c) Respiratory System

Larynx food particles

Trachea frothy fluid Bronchi frothy fluid

Pulmonary Pleura Marked greyish-white thickening, most marked in lower lobes.

Pulmonary Vessels normal

Right Lung (weight) 970 grams, marked edema, fine granular feel to palpation.

Left Lung (weight) 990 grams, marked edema, fine granular feel to palpation.

(d) Circulatory System

Heart (size and weight) 450 grams, moderately large

Auricles (size contents) dilated, liquid blood and post mortem clots.

Ventricles (size contents) LVW ~~0~~.5 cm., RVW 0.4 cm. Thickened left ventricle, blood and post mortem clots.

Tricuspid Valve 12.5 cm., normal

Pulmonary Valve 9 cm., moderately dilated, normal.

Aortic Valve 7 cm., normal

(e) Gastro-intestinal System

Oesophagus normal

Stomach and Contents Considerabl partially digested food, normal mucosa, moderately dilated.

Intestine (and Appendix) normal, appendix present.

Liver (size, weight and character) 2045 grams, moderate acute congestion.

Gall Bladder moderate cholesterolosis

Spleen (size and weight) 340 grams, enlarged, firm.

Pancreas (weight) normal

Mesenteric Lymph nodes Normal, patch of mild thickening of parietal peritoneum in left flank.

(f) Genito-Urinary System

Adrenals (with weight) normal

Urinary Bladder normal, empty

Kidney and ureters normal ureters

Right 150 grams, congested

Left 120 grams, congested

Prostate Moderately enlarged and nodular.

Urethra Normal, penile urethra not examined.

Testes and epididymes normal

Scalp ... normal

Meninges and Blood vessels ... normal

Skull (with thickness) ... normal

Middle ears and Sinuses ... normal

Remainder of Osseous System ... normal

(h) Nervous System

Brain (with weight) ... 1400 grams, normal

Hemispheres ... normal

Ventricles ... normal

Pons ... normal

Cerebellum ... normal

Medulla ... normal

Pituitary Body ... normal ... Pineal Body ... normal

Spinal Cord ... Upper cervical normal, remainder not examined.

'Lungs: Acute congestion and some edema. Focal fibrosis, numerous asbestos bodies, marked pleural thickening. Hilar Lymph Nodes: Focal fibrosis, enlarged, fragmented asbestos bodies. Heart: Focal fibrosis, focal acute necrosis.
Coronary arteries: Marked arteriosclerosis with old occlusion with re-canalization and occlusion by arteriosclerotic material. Liver: Mild acute congestion.
Spleen: Moderate acute congestion. (Continued under Supplementary).

X-RAY FINDINGS (IN BRIEF)

None taken

SUMMARY OF ABNORMAL FINDINGS

(1) Marked coronary arteriosclerosis with thrombosis.

(2) Focal myocardial fibrosis and focal recent infarction.

(3) Marked pulmonary edema, acute congestion of liver and kidneys.

(4) Cholesterolosis, moderate.

(5) Asbestosis involving both lungs.

CAUSE OF DEATH

I hereby certify that I have examined this body, have opened and examined the above noted cavities and organs as indicated, and that in my opinion the cause of death was:

Coronary Occlusion due to Coronary Arteriosclerosis

(Continued from 25):

Thyroid: Mild focal lymphocytic infi ration. Kidney: Acute congestion.

Peritoneum: Mild fibrous thickening b t not dense fibrosis as in pleura.

Remainder of organs: Essentially nor 1.

A. J. Noble, M.D., AJNoble Pathologist

NOTES

In the case of organs not examined, write the notation, "not examined" in the appropriate space.

Describe injuries by continuity.

If more space is required, for the detailed description of imp rtant conditions, use the space indicated above, or attach hereto, a separate sheet, giving the number f the section to which reference is made.

Each separate sheet must carry the signature of the pathologist.

rage weight and size of normal organs in adults

	Male	Female
1. Brain	1450 gms (50 oz)	1250 gms (45 oz)
2. Lungs—Right	625 gms (22 oz)	500 gms (18 oz)

ATTENTION: LINDA KAHN

The following submission was done as an assigment for an Environmental Course at the University of Toronto. Please accept this assignment on behalf of a concerned citizen to the problems arising from the use of asbestos.

Yours truly,

Sandra Elia

Sandra Elia.

INI 220Y ASSIGNMENT ON ASBESTOS CASE STUDY

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ASBESTOS CASE STUDY

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PART ONE- ASSESSING THE RISK

1. INTRODUCTION

As a concerned citizen in Ontario, I feel it necessary to address the problems surrounding asbestos. My interest in asbestos was invoked by the increasing number of problems associated with asbestos and disease, in both the work place and the general environment. The intention of this submission is to document research in specific areas of the problem. This paper will discuss what is reasonable for industry and the public in terms of how they are exposed and affected by asbestos. Moreover, by addressing specific areas of uncertainty that require further research, I intend to properly address the problem in terms of cost/benefit analysis. It is not my intention to set a standard for asbestos in the workplace or in the environment but to suggest areas of research which would enable the health hazards to be minimized.

1.1 Varieties of Asbestos

In defining asbestos as a risk, the probability of being exposed to it, especially in industry is believed to hold adverse consequences. The cause-effect relationships to asbestos depend on strength of exposure which will be discussed later in this submission.

Asbestos, is a mined mineral of great abundance in Quebec. The mineral can be separated into long silky fibres. Three main kinds of asbestos, chrysotile, amosite and crocidolite are used for commercial use. Chrysotile (white asbestos), being the most abundant and most used belongs to the serpentine group of minerals. In the context of this submission, I will consid defining what is acceptable in terms of exposure to chrysotile. I intend to concentrate on chrysotile since it is mined in Canada and the focus of understanding associated problems must start at the source.

1.2 Benefits from Asbestos

Many components concerning safety in our environment can be attributed to using asbestos, despite the risk associated with it. Asbestos,

once a boom for trade balance to Canada, is not only valuable commercially for fireproofing but also indestructible because, the fibers cannot be brok down. It is useful in combining properties of strength, fire resistance and fibrocity, all of which are difficult to reproduce. The greatest benefi derived from asbestos is its resistance to fire. Other uses include providing protection against weather, corrosion, vibration, cold, acid, frost, dust, alkalines and accident (Lee & Selikoff, 1978). As a result, although asbestos is a health hazard, it protects mankind against greater envirironmental hazards. But, we are forced to concern ourselves with industry and associated health problems when interpreting the risk.

1.3 Public Health

A lot of public concern is generated when asbestos becomes a public health issue. The greatest harm comes from exposure to asbestos where fibers are inhaled. Inhaled fibers penetrate into the lungs and the body cannot break down or destroy these fibers. The body then surrounds each fiber with a scar to wall it off. The scar formed from the fiber becomes hard and inelastic (making the lung more rigid) pulling the surrounding tissue. Next, the pulling of the scar tissue causes the air sac to be ripped apart. The lung ceases to transfer oxygen to the blood stream adequately. Thus, the heart is forced to work harder and heart attacks may result.

Asbestos related diseases include asbestosis, which is caused in the lung, mesthelioma, neoplasms of the pleura, and clubbing which causes fingernail beds, a sign of lung disease. The overall biological response to these diseases depends on not only the person exposed but also the lengt of the inhaled fibers. It is not the intent of this submission to extensively outline the diseases associated with asbestos, but to discuss its acceptibility.

Is asbestos a public health catastrophe? In relation to the public asbestos and its problems do not stop in the industry. Workers in construc tion, shipyards, asbestos mining and processing, autobrake repairs may be

potential victims of related diseases. In schools, ventilation systems pick up asbestos fibers from insulation in false ceilings, blowing them into air breathed by office staff, students and teachers. Also problems of chipping of sprayed asbestos from gymnasium ceilings represents a hazard in schools where children are continually exposed. Asbestos fibers have also been found in alcoholic and nonalcoholic beverages where asbestos filters were used. Tailings of asbestos can also accelerate the eutrophication of lakes. Asbestos tailings have also been dumped in waste areas where children play. These areas were not even sealed off from the public as a hazardous area. Thus, problems associated with contamination and health risks receive the greatest attention. In fact, it is the responsibility of Canadians to promote further studies and substitution in the areas mentioned above.

It is evident that the probability of risk in the environment is high, as demonstrated through the diversity of asbestos application. Our perception of the risk may change but it will always remain unless we are able to define what is acceptable to human health.

PART TWO - MANAGING THE RISK

2.0 Uncertainty

Managing the risk of exposure to asbestos is difficult because investigations and sampling data are often inadequate. Problems associated with epidemiological studies and methods of measuring exposure to the risk hinder the pathways of information necessary to understanding the cause and effect relationships. Thus, research needs to take place in specific areas to fill in the gaps.

2.1 Types of re search to define an acceptable risk

Methods to research the asbestos risk require proper measuring according to circumstances. These include occupational versus general environment concentrations of asbestos along with monitoring the environment at large versus determining the exposure to individuals. Processes that would allow such monitoring would require detailed

characterization of exposure through measurement of variables. These include size and shape of individual fibers, number of fibers, total mass of asbestos and type of asbestos. Monitoring in these areas would provide us with more knowledge regarding exposure and the effects that go along with it. This type of information would improve our overall understanding of the problem. The frequency of measurement in these areas would depend on available information regarding exposure. However, recent studies that have been done through the process of monitoring have certain limitations on making a clear cut decision regarding defining an acceptable level. Pathways of information are scanty and incomplete. These gaps exist especially in understanding the cause/effect relationships of exposure to asbestos.

2.2 Priorities to solving the problem

Certain pitfalls in epidemiological studies exist. These include uncertainties in extrapolating animal data to human exposure, (making it difficult to conceptualize the risk) and failure to specify latent periods along with over-lapping exposure and follow-up periods in dose-response studies. Greater clinical research is also needed to understand mechanisms underlying disease causation. This problem is one that impedes efforts to measure and control human exposures to the substance.

What about the problems associated with environmental monitoring? This includes the air, food, lakes and dump sites. In order to fill in the data gaps in these areas, I will make the following recommendations.

1/ Epidemiological investigations should include a clinical course of action. For example, workers exposed to asbestos in the past in shipyards, insulation work, brake repairs, factories, industry and construction trades should be used as a data base. The experiment would include the establishment and maintenance of uniform procedures for collection storage, retreival of vital employee data, pre-employment periodic examinations, along with implementing audits of employee health records. This should be done done at all sites to detect problems at the earliest stage. (Kotin, Johns-Mansville).

Moreover, it would be necessary to uncover the history of relevant exposure by identifying the job an individual held and for how long. Unfortunately, in the past, records were seldom kept. Because the latency period is usually 25-30 years, abnormalities are difficult to detect and analyze especially when records on employees(ie. in the asbestos factories are unavailable. In fact, latent periods may be related to the intensity of exposure and as a result, for each exposure level, a different mean latency period probably exists.

2/ The greatest problems in understanding exposure to asbestos lies in interpreting the dose response relationships. In theory, measurements in the workplace rely on what exposure level has taken place. Dose is the amount of asbestos fiber or dust retained in the lung where response is the result of past exposures, for which data records are lacking. The susceptibility to asbestos can relate to several biological characteristic: These include efficiency of clearance mechanism in the lung, anatomic characteristics of the lung, airway system and physical fitness. (Shugar/' Thus, individuals respond differently to a given dose.

Problems exist in extrapolating dose because an increased time that cells are exposed to asbestos may not necessarily result in increased damage. The concept of threshold is introduced when dealing with dose response. Two types of threshold can exist. First, that there exists some non-zero dose below which the risk is zero; second, that any dose, no matter how small involves a corresponding risk. Thus, the overall choice towards asbestos lies between prohibiting its use or deciding on a safe acceptable level. Gaps with determing the threshold lie in scanty epidemiological data because taking a random population at a risk who did not contact disease would not give us a threshold value. (For further information and documentation regarding dose / response studies see the report completed by Dr. D. L. Sackett.) Because information in this area is incomplete I suggest that studies look more towards balancing the risks to human health against benefits of using the material.

In fact, there is a greater need to establish an explanation for variations in biologic response in order to establish a criteria for environmental control. The following sections will address this issue in terms of research and measuring.

3./ Clinical research for understanding the impact of asbestos and safety rest heavily on biologic expertise in the subject. This would include proper examination of its effect on cells, tissues, organs and organisms. Meterodoligical expertise is also necessary in a critical assessment of data regarding the etiology of causation.

4./ Envi ronmental research is necessary because asbestos is such a widely used product. Gaps in research exist in developing methods of analyzing how much pollution is given off by asbestos mines; what is picked up by asbestos filters and its use in food and water pipes.

Reasearch needs to start in field areas surrounding the mine and the plant. Mine tailings are often found in local dumps and local lakes, where children may play.

First, sampling of air surrounding the plant is necessary, but poses several problems. Winds can blow pollutants toward or away from sampling stations. In fact, the concentrations are highest in the stations when actual exposure levels would be lower than average asbestos concentration in samples analy zed (MOE,/77). Thus, I suggest that stations be established close to the plant, and in the local vicinity that will measure asbestos concentrations on a daily basis as will be outlined in the following section.

The analysis of asbestos concentrations in food, water pipes and filters will depend on the establishment of proper techniques to fill in the gaps. This would involve measuring concentrations and deciding whether they are acceptable as exposure to asbestos. In terms of what is reasonable, I believe that if substitutes are available they should be used to replace asbestos in these areas. However, we must first establish their harmfulness to the public through research studies to

measure the effect. Thus, this would involve assessing problems associated with these agents in man. Certain monitoring methods will be outlined in the next section together with understanding their limitations.

PART THREE- ESTIMATING THE RISK

3.0 Monitoring

The monitoring and measuring of asbestos must take place where environmental stresses are highest and where the effects are most likely to occur. The overall risk of asbestos is assessed in terms of effects to human health. Thus, sampling must occur in order to determine the effects. Long latency periods for carcinogens and other diseases make it very difficult to determine the cut-off point for the assessment of future risks (Whyte,/80). Moreover, the difficulty in assessing and testing procedures will help to alleviate these problems. Monitoring can be grouped according to both environmental and social components because the risk relates to what happens in the environment and what social processes are at work (Whyte,/80).

3.1 Measurement of Asbestos in the Workplace.

In order to properly evaluate the risk involved in the workplace, I believe that co-operation between the workers and companies is essential. I suggest that collective agreements with union members and company personal be established in an attempt to monitor the area together.

Certain optional methods are available to the industry in analyzing air samples in the workplace environment. I have decided to outline methods I find most appropriate to monitoring asbestos. These include using a midget-impinger, an electron microscope and a fibrous aerosol monitor.

By sampling air-borne dust, the miget impinger bubbles dust particles through isoprophyl alcohol, impinging particles to the bottom of the collection tube. Dust samples are counted after being mounted on slides, using a 100x microscope. However, NIOSH (National Institute of Occupational Safety and Health) developed an improved filter technique.

It enables the actual asbestos fiber to be counted rather than all types of dust/as in midget impringer. The process involves passing two litres of air/minute through a filter membrane which entraps the fiber. The fiber is then mounted on a microscopic slide and fibers are counted by using 450 to 600x microscope and recorded as fibers/c^3 (Taylor /78). This monitoring method allowed data analysis about asbestos bodies and uncoated fibers. In fact, the benefit of this method is that it enables not only the institution of concrete environmental programs but also the education of employees on the proper handling of asbestos fiber (Taylor /78).

The electron microscope is very accurate in measuring asbestos concentrations. The normal method for industry is using the optical microscope (under phase-contrast conditions). It has a magnification of 400-500 x. I believe the optical microscope should be discontinued wherever possible because it is not as accurate as the electron microscope which has a magnification of 25,000 x (Environmental Asbestos, /79). In fact recent studies have shown that greater accuracy exists in mesurements. For example, the researcher can get a reading of zero fibers /ml using the optical microscope whereas with the other method the zero fiber measurement is 1,000 ng/m^3 in a city atmosphere. (Environmental Asbestos /7 Counting fibers using the optical microscope proves to be tedious and extensive which can lead to eye strain and inaccuracy. However, high costs, long analysis times and limited availability of equipment prohibit continued use of electron microscopes. I believe that for proper environmental measurements to take place, the government may need to legislate it as a necessary measurement in industry.

The final recommendation for air sample measurements is using the fibrous aerosol monitoring device. This method uses beams of light which allows particles to scatter light in the detector. The fibre then produces a series of scattered light pulses as it passes through the detection volume. These pulses are then converted to electrical signals to be analyzed by the electronic detection system (Rajhans /81).

Two variables, the ratio and the amplitude, relating to pulse shape, (height and sharpness) are measured. Moreover, the higher the threshold settings, the lower the count rate and the higher the noise discrimination of the instrument (Rajhans /81). The advantage offered using this method is that it allows real-time monitoring of asbestos fibers in the workplace This is done by placing a membrane filter cassette to capture air that passes through the sensing tube. However, in the presence of welding fumes and nuisance dust, the unit behaves erratically, thus impeding the process and the objective.

Depending on which method is most applicable to industry at this time, it is necessary to discuss where and for how long monitoring should take place in the workplace. Measurements should take place on a daily basis, three times a day in specific areas of the plant where concentrations are highest. Therefore, specific stations would be established ar maintained. This sould continue on a monthly basis until enough data is collected to substantiate the results, which at the outset could take a year.

3.2 <u>Measurement of Asbestos in the Environment</u>

At this time I don't think it is possible to document research that indicates that for every dose of asbestos, there is an appropriate biological response by the victim. In order to understand the responses to very low doses in the environment, better research techniques are necessary, including understanding how susceptible certain individuals are to exposure.

Firstly, it is essential to detect fiber concentrations in the atmosphere surrounding asbestos plants. This could be accomplished by setting up air samplers that draw 100 cubic metres of air through a filter which traps asbestos and other particulate matter. (MOE /77). The stations could be operated on a 24 hour basis, at distances of 100 ' from the plant, ½ mile, 1 mile, and 2 miles from the plant.

The machinery could determine fibres about five microns in length.

But, wind dispersal can account for variations in data analysis. As a result, a lot of discretion must be used. I believe that subsequent improvements in milling practises, through the installation of an agglomeration system or a pug mill (which wets low-grade fibres) could effectively lower emissions so that no visible dust was seen on discharge.

In order to analyze problems in air, in areas surronding the plant as mentioned above, water, in local pipes in the vicinity or in lake samples food and beverage samples could be taken were asbestos was in higher concentrations. A membrane filter could be set up on a daily basis where measurements could take place three times a day or when appropriate. This common procedure involves a single-step filtration where all suspended particulate material in the medium is entrapped together with suspended asbestos. (Levine /78). This method can also utilize a dual filter system. This involves using coarser filter first which entraps the larger material while allowing smaller material (including most of the asbestos) to pass through to be collected on a second (finer) filter for analysis. (Levine /78). However, certain limitations exist when using this method. Where asbestos concentrations are low, concentrations of other particulate materials are high ; filter loading increases the collection characteristics. This change causes an increasing amount of asbestos fibers to be trapped on the first filters.

Likewise, an environmental filter composed of cellulose-ester membrane filter can remove asbestos fibers from both the water and air. Its efficiency is 99.9% removal in water and 100% efficient to removal of asbestos in the air (Levine /78). Thus by establishing measurement techniques as mentioned above a complete analysis of fibres and their concentrations could take place. Air and water sampling is an important public health problem which needs to be addressed in assessing the asbestos issue.

3.3 Difficulties in Measuring / Accuracy

In terms of what is reasonable in dealing with the problems of

measurement, the room for error in measuring specific parameters, (shape, mass, size and type of asbestos) can cause some difficulties. There are high costs in proccessing data, along with tedious counting methods which can lead to inaccuracy. If employees are trained within the plant as to the methods of collecting and analyzing dust samples, how can we be sure they are measuring in the proper places? I recommend company supervision checks on a daily basis together with the establishment of an Environmental Committee. This committee made up of management and of labour, could carry out inspections of the plant once a month and meet to discuss phases of environmental control. I feel that asbestos exposure and measurement has remained in the dark too long and controls on establishing a safe workplace need to be implemented.

3.4 Relationship between the Dose and the Effect.

In light of the above recommendations towards monitoring of asbesto is it biologically plausible to assume that excess cancer mortality is approximately proportional to the dust levels that should be accepted? (Peto /78). It has also been hypothesized that excess mortality from exposure to asbestos may be proportional to the dust level for each cause. In fact, after 50 years of exposure to asbestos, at 2 fibres/ cm^3, 10% of male workers might die. (Peto /78). The measurement of dose-respon requires a sophisticated model to describe the slow initial rise (the effect at low doses). But, the uncertainty exists among the selectivity of individuals who develop respiratory symptoms, saturation at high exposure, lack of data pertaining to latency period, and error in estimates of dose. Thus, it is essential to dev ise the proper monitoring material to decrease the error in measuring the dose. The acceptibility of exposure to dose will be developed in the final section of this report.

PART FOUR - RISK EVALUATION

4.0 Available Alternatives

In order to understand the limitations towards using substitutes for asbestos, the problem must be looked at realistically. Would society

as a whole, suffer if a range of asbestos products were eliminated, especially when these products were designed to protect health, life and property? It would be unwise and unreasonable to substitute unproven materials whose health effects are unknown.

The major substitutes for asbestos that are available at this time are synthetic mineral fibres. This includes glass, rock and ceramic fibers. Unfortunately, certain limitations exist in using these materials as will be discussed later. Much of the contraversy regarding substitutio rests in understanding the urgency and uncertainty that prevails. Therefore, the appropriateness of substitution depends heavily on these factors and the bulk of this section will deal with this.

4.1 Urgency in Specific Areas

Since the effects of low levels of exposure to asbestos are unknown at this time, I feel that asbestos concentrations should be eliminated as soon as possible where a proven safe substitute can be used in all applications. The aforementioned substitutes require more research; thus, both workers and the public should demand greater precautions. In fact, studies should look towards replacing asbestos in water pipes, food and beverage filters. I also recommend that certain priorities be established towards removal of asbestos in hazardous areas such as schools. Friable asbestos, incorporated into school buildings can create a potential health hazard to all concerned. Where asbestos material is damaged or contamination is suspected, wet removal should take place. This would include the encapsulation of the area to be used as a permanent corrective action.

4.2 Uncertainty in Substitution

Much uncertainty exists in using synthetic fibres because at present it is unknown what fibre sizes are critical to causing cancer. The only safe approach available at this time would be to manufature all synthetic mineral fibers so that they will not break down in use.

Some asbestos substitutes such as glass fibers and calcium silicate are very dusty. In fact, inhalation can produce troubled breathing along with chest pains among workers and homeowners in the area (Substitutes for Asbestos /79). Research in this area must continue but caution must be used. The problems associated with fiberglass do not always coincide. The application in lodgement in experimental animals is artifical and can't be duplicated in vitro(Milne/76). In fact, some hypotheses indicate that long thin glass fibers would increase the bio-chemical activity of the cell ensuring their retention in the cell. A recent report completed by Fulmer Research estimated that asbestos substitutes are available for about 90% of the frictions market, but, alternatives may be more expensive (McGinty /77).

In essence, what the industry and public need is greater research to correlate human / animal and health effects. This would include methods of sampling and assessment in reference to the sizing of fibers and the use of the electron microscope. A documented report done by the United Kingdom in International Environment Report, analyzes specific recommendations, substitutes and their suitability (see appendix)

4.3 Cost /Benefit to Human Health of Substitution

In analyzing the cost / benefits of asbestos use in the workplace and the general environment, it is essential to look at the effects on industry, the public, and the gains regarding the institution of substitut I believe that a product should be discontinued if its application will create asbestos related problems. For example, at present, replacement materials exist in paint, glue, joining materials and sparkle (Public Interest Group /79).

In dealing with cost / benefit we must consider the economic considerations involved. I believe it is important to first agree on what the objectives to be satisfied in substitution are. Second, do we need to place a monetary value on a human life to get action? (Whyte /80). The purpose of analyzing cost / benefit is to allow a comparison

between the cost of substitution and the benefits to society. In the industry, the costs of implementing substitutes could lead to an increase in operating costs, due to decreased employment, profits and productivity. Also, it is difficult to assess future competition because market prices are inaccurate to opportunity, costs of input and output. In fact it may cause smaller industries to close up because they are unable to meet the costs of cut-back. But, the benefits of limiting its use are numerous. Substitution by other materials would create jobs outside the asbestos industry especially in the manufacture of glass fibers. The benefits of improved health towards greater efficiency in the workplace could decrease claims against industry. Overall benefits in the community would also exist. I feel that it is important to analy ze cost / benefit in terms of what is practicable. Having alternatives is necessary because it allows the avaliability of substitutes and freedom to choose.

PART FIVE - RECOMMENDATIONS TOWARDS DETERMING AN ACCEPTABLE RISK IN THE WORKPLACE & GENERAL ENVIRONMENT

5.1 Approach to assessing the problem

In order to assess the problem surrounding asbestos exposure in the workplace and general environment, I believe that the benefits / risks should be distributed in a socially acceptable way. In assessing the overall risk, there are several approaches to outlining its acceptibility in specific sectors of society. This would also include the distribution of the risk and the ethical implications.

5.1.1 Zero Risk / risk-benefit / cost-benefit for the industry & the publi

At present, I feel that zero risk to exposure will eventually be necessary in both the workplace and the general environment. Zero risk means no amount of exposure is free from risk, therefore, there is a need to prevent unnecessary exposure. In the light of what is reasonable at this time, it would be unwise to eliminate asbestos totally in society. The benefits from its use especially in fire proofing,

outweigh the risks. Thus, I recommend that where possible, precautions should be followed. In the workplace, this could include, careful handlin of containers to prevent spillage, use of dust control exhauhst hoods at all stages of in plant handling, where dust is unavoidably created. Also wearing protective respiratory equipment where necessary and proper clean-up of areas is recommended. (Selikoff /79). I suggest that asbestos be eliminated from consumer goods and health checks and data be collected to outline the ingredients of these goods.

In the light of risk /benefit and cost / benefit approaches as outlined above, economic considerations that are best for the prevention and control of asbestos are essential. In terms of what is reasonable, the best practicable technology for reducing the risk would be one where the lowest environmental limits were achieved. This would be done through the application of modern engineering techniques to be established in new plants. This would include installation of exhaust fans, duct-work, filters, precipitators with high capital costs for installation and maintenance (Selikoff /78). Thus, the feasibility of controlling the risk will involve both costs and benefits which cannot be separted. Is the cost of control feasible, or should government legislate the need to establish technological improvements?

In terms of cost / benefit, installation and equipment will increas the cost of control; however, socioeconomic benefits will increase. Available resources to provide protection from exposure are limited but compensation and work atmosphere will improve. I do not believe that economic considerations should be placed above human health and safety in dealing with the asbestos problem.

In terms of risk / benefit as outline above, studies need to be completed to understand the need for the product, cost and availability of substitues, industry structure and employment, energy consumption, growth, profitability, and market segmentation (Head /78). Studies completed in these areas will determine the feasibility of eliminating

asbestos in most products.

5.2 Distribution of the Risk

The distribution of the risk to asbestos is felt in both the occupational and environmental sectors of the population. Certain ethical implications exist when dealing with the risk because it poses a hazard to many individuals. Thus, in setting a standard several factors must take precedence.

5.2.1. Ethical Implications

In determining the acceptibility of a standard it is essential to look at both the degree of social and medical control of the victims of asbestos exposure. In assessing the risk, it is difficult to assign a cash value to social sentiment, that are given to prolonged life and health (Selikoff /78). At the recent Royal Commission Hearings being held in Toronto, ailing pensioners and widowed wives spoke of the diseases they had to face. They outlined how asbestos can take over the body eventually causing pain and death. How do we assess compensation to the loss of life?

I believe that respect for human well-being and life should no longer be placed second to the press for production, productivity and economic well being. (Head /78). This is evident through long difficult struggles workers have had with their organizations concerning diseases. I believe workers' health is a very important issue in the asbestos proble Thus, concerning safety issues, I suggest that a joint safety committee be established to report unsafe conditions not only to the company but also to the environmental agencies. Moreover, companies must have safety clauses written into collective safety agreements in order to enable opinions from management and labour to be freely expressed. This would also enable workers to have more of a say in their environmental setting. The employer should also realize that he is hiring the employee as a whole, his body, mouth, mind and not just his hands (Head, /78).

Occupational health is a slow process; workers may pay with their

health and lives due to the reluctance of industry, medical, union and government officials to confront the issue head on. (Tataryn /79). I believe that workers volunteer their services to the employer and they should not be subjected to risks in the workplace. This type of risk is involuntary. It is the employer's obligation to provide a safe working environment. Should people be placed in a situation where they must rationalize health risks in their everyday lives for the sake of progress or jobs? (Tataryn /79).

5.2.2. Where should we keep asbestos?

Asbestos should be kept where no available safe substitutes can replace it. It should not be used if less hazardous substitutes are available. There should be a ban on asbestos toys, modelling materials and products containing asbestos from which fibers can be released. Even asbestos waste is a problem and the only course of action is for it to be buried.

I feel that asbestos should be permitted where absolutely necessary This includes its use as friction material in brakes, as reinforcing material in certain heavy duty packaging material, and as insulation against heat under certain limited conditions (MOL.).

5.3 Public participation & generating awareness

I feel that public participation will aid in determining a safe level of exposure to asbestos. This would include instigating public policy to minimize the extent of emissions of carcinogenic substances and mine tailings. In fact, I feel that the general public could also aid in making measurements of airborne asbestos in buildings they work in and/ or waste dumps that their children play in. Moreover, to increase public awareness in the asbestos issue, advertisements could appear on local television stations. These advertisements could stimulate the public as viewers. Presently, the Workmen's Compensation Board advertisements emphasize the concept that workmen can prevent accidents by being more careful and following rules and regulations. Why not parallel

that type of advertising with some showing disabilites caused by industrial contamination (Tataryn /79). This would demonstate that these disabilities could be prevented by changes in equipment, plant design and useage of specific materials (ie. asbestos). At present, the commercial focuses on injury. This only reinforces diversion of attention away from disability and death caused by disease from working within the industry.

5.3.1. Scientific Research

In order to determine what acceptable risk is best for asbestos expossure, scientific research plays a large role in its establishment. The amount of data required for making regulatory decisions is immense and often contraversal due to a lack of consistency in data. Since economic sectors are the same in all countries, I feel that it is essential to continually review new information about research (especially in areas outside North America.) This would ensure that conditions remain satisfactory and updated to present standards in the workplace and the general environment. Therefore, international co-operation is desirable to decide what responses should be recorded as indicators of effects on health (Berry, /77). In fact, information gaps and eventual benefits may be filled in for those who are occupationally exposed to asbestos.

5.3.2. Government Intervension

Government intervension is necessary and urgent in establishing a regulatory standard for the ban and / or control of asbestos in both the workplace and the general environment. Legislation will require co-ordina action on the part of federal and provincial authorities to permit and provide adequate safeguards against occupational careers. (Tataryn /79). Preventative action is necessary when dealing with asbestos and I believe it is essential to prevent further hazardous problems. With this in mind, I feel that an industrial health board should be established to police conditions surrounding the industry and the environment. This board could file monthly reports as to the problems within industry from

both management and employees on working conditions and monitoring studies

In defining an acceptable dose in both the industry and the general environment it is essential to understand the degree of disease or what symptom we use as an index, and what incidence of this index is acceptable (MOL /77). In choosing population samples, consistency of data, levels of exposure and time of exposure, rest heavily on properly analyzing the problem and setting an acceptable standard. However, in dealing with lower dose, lower level of exposure, human data at this time provides no evidence for a threshold or for a 'safe' level of exposure to asbestos (U.S. Dept. of Health /76). Thus, in determining a standard for exposure to asbestos, it should be set at the lowest level detectable by available techniques with the premise of eliminating asbestosis development. The standard should be designed for processing and manufacturing of asbestos along with its application in certain products.

5.4 Future Aspects

In order to assess the problems associated with asbestos, we must look towards future needs. Technologically and economically, the replacement of asbestos will invoke high capital costs for industry and possibly the public. Therefore, in setting guidelines towards accepting the risk, certain priorities must be given attention. If the country is willing to pay for the safety of asbestos workers, for protection of the public against less well-proven hazards, asbestos can be virtually eliminated (McGinty /77). However, lowering the safety standard would not necessarily eliminate the occupational disease caused by exposure. As a result, the public would be afforded no new protection. Research studies must continue in order to bridge the gap surrounding low dose exposure, especially in the general environment.

PART-SIX SUMMARY AND RECOMMENDATIONS

I feel that the problems surrounding exposure to asbestos need to be more clearly documented. This includes the overall effects on both the environmental and occupational sectors of society. At present many

people suffer the consequences of exposure to asbestos. It is hoped that this report has stressed the urgency of controlling and eventually eliminating the exposure to asbestos. I believe that if strong support from the public is generated in both environmental and occupational settings, that the decision making process towards determining how safe asbestos really is, will become more clear.

6.1 Setting Priority

I recommend filling in the gaps that make it difficult to determine a safe level of exposure to asbestos. This would include instigating specific processes to measure effects on health past and present. Pathways of information about causation need co-operation and responsible management to evaluate the process.

6.2 Factors not to be forgotten

Health hazards start in the industry, and long term exposure can produce adverse reactions in those exposed. Employers should be required to provide safe working conditions for employees. Risks can only be down-played for so long.

6.3 Criteria

Greatest need exists in establishing:

1. criteria and standards for an environment of high quality;
2. scientific data on which to base regulations;
3. fundamental imformation on which to base criteria;
4. assessment of problems associated with interactions of multiple agents in man;
5. scientific basis for determining benefits and risks in relation to control measures; and
6. a better understanding towards cause-effect relationship (Kotin- Johns-Mansville).

6.4 Public Awareness

I believe that public awareness concerning the severity of the problem, especially when dealing with asbestos fibers in schools, would help to promote public pressure. In effect, this would force government to act more quickly towards the asbestos problem.

6.5 Assessing the costs and benefits

Substitution of asbestos where possible is a necessary procedure. Only by assessing continued use to asbestos will we understand the risks involved. However, at this time benefits of eliminating the risk are worth the cost.

6.6. Resolutions

The principal answer to determining a safe level of exposure to asbestos requires the proper management and assimilation of data. Continued research and the exchange of data can only promote our understanding of the problem at hand.

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INTERNATIONAL ENVIRONMENT REPORTER

United Kingdom

NEW CONTROLS ON MAN-MADE FIBERS RECOMMENDED BY HEALTH COMMISSION

LONDON—New control limits on airborne concentrations of man-made mineral fibers were recommended July 11 by the Health and Safety Commission in an effort to reduce the health threat posed by these substances.

However, the commission said that research so far has failed to demonstrate a cancer risk to man from such fibers and that it cannot therefore suggest a threshold limit value based on the risks associated with using these materials.

Man-made mineral fibers, such as glass fiber, rock and slag wool, are used as substitutes for natural fibers such as asbestos, which is a known carcinogen.

The commission nonetheless warned that "the implications of animal studies should not be ignored and it would be prudent to regard very fine fibers with suspicion."

The central problem is that, although there is no evidence of carcinogenic effect in workers, animal experiments have shown that fibers of a certain shape and size may induce tumors.

The proposed new limits, along with many recommendations, are contained in a report made to the commission's Advisory Committee on Toxic Substances by a working party set up to review present policy on the health risks of man-made mineral fibers.

The report recommends introduction of a fiber-count control limit of five fibers per milliliter of air, to minimize inhalation of respirable fibers (less than three micrometers in diameter). However, labor union members of the working party disagree with this recommendation. They want the limit reduced to three fibers per milliliter.

The report also proposes that the mass concentration of fibers should not exceed five milligrams per cubic meter of air. The threshold limit value for "nuisance dusts," which currently applies to man-made fibers, is 10 milligrams of total dust per cubic meter.

"In any case," the report says, "no exposure should be considered acceptable if it can reasonably practicably be prevented or reduced." While both mass concentration and fiber count control limits should apply simultaneously, "it is likely that for a particular product one of the two control limits would be more appropriate than the other. Cross checks at suitable intervals would, however, be required to ensure compliance with both."

In most manufacturing situations where engineering control is possible, the new control limits already are being achieved, according to the report. Where they are not, the new standards "should be achieved with the minimum of delay." However, in some situations, such as construction sites, "special difficulties arise and the time needed may be longer, but should not exceed three years."

Other conclusions of the report include findings that:

- No evidence has been produced to indicate that man-made mineral fibers cause fibrosis of the lung.
- Skin and eye irritation are unpleasant but do not appear to cause long-range disease.
- Irritation of the upper respiratory tract may be caused by non-respirable fibers, but does not appear to be irreversible and constitutes no long-term risk to health.
- Most studies suggest that bronchitis is not an occupational hazard of exposure to man-made mineral fibers but if any cases of bronchitis are attributable to it they are few in number.

The working party stresses that while current medical and scientific information has been taken into account, "at this stage it is not possible to set standards which are determined on this basis. The recommendations are therefore based on the application of normal occupational hygiene principles, which are to prevent exposure where it is reasonably practicable to do so and to keep as low as is reasonably practicable any unavoidable exposure." The recommendations are "interim," and should be reviewed "as soon as significant new information becomes available."

The report calls for more research into health effects, the relevance of animal experiments to humans, and the standard methods of sampling and assessment—with particular reference to the use of electron microscopy and sizing of fibers.

Other recommendations cover ways to eliminate airborne dust and fibers: "Users should increasingly look for products which do not contain any super-fine fibers, and manufacturers should make determined efforts to meet such a demand."

However, the report also recognizes that particular uses of man-made fibers may be dependent on specific fiber diameters, and that elimination of these fibers may increase skin irritation. In such cases, it advises that "the materials should be preformed or encapsulated to prevent the release of dust. If dust is unavoidable, engineering controls such as local exhaust ventilation should be used. Only if no other method of reducing airborne dust is available should respiratory protective equipment for workers be used."

The report recommends that the Health and Safety Executive issue a guidance note based on precautions set out in an appendix to the report for manufacturing and use of the materials. It also was recommended that a medical leaflet be prepared for workers.

The discussion document, "Man-made Mineral Fibers," is available from Her Majesty's Stationery Office. Comments on the report should be sent no later than October 19, 1979, to R.G.H. Eltze, Health and Safety Executive, Hazardous Substances Branch D2, 25 Chapel Street, London NW1 5DT.

TABLE 20-1

Progress in Introducing Substitutes for Asbestos-containing Materials Specified by the Navy Department (522)

Application	Asbestos material	Progress in introduction of substitute materials
Thermal insulation in machinery spaces	Calcium–silicate sections and plastic	Now supplied asbestos-free and recognizable by its yellow or pink color. All calcium–silicate should be cut off ship so far as is practicable (Note: Calcium–silicate containing up to 14% asbestos is colored white).
	Amosite–asbestos sections and plastic	No longer used, replaced by calcium–silicate. A large number of existing ships are insulated with amosite; delagging operations will involve the full implementation of D.C.I. 510/69.
	Self-setting finishing cement for high temperature insulation BD2 cement	An asbestos-free substitute is now specified.
	New-tempheit	Deleted from specifications. Replaced by calcium–silicate.
	Asbestos cloth	Glass–cloth is now specified. Dust emitted from this cloth is an irritant but not a health hazard. Work is continuing to make this cloth less objectionable to handle.
	Asbestos rope and twine	Deleted from specifications. Glass is now specified.
	Asbestos mattresses	Mattresses of rocksil fiber covered with glass–cloth are now approved and in supply.
Local protection against fire	Asbestos millboard (very little used)	Deleted from specifications.

TABLE 20-1 (*Continued*).

Application	Asbestos material	Progress in introduction of substitute materials
	Asbestos cloth (more frequently used)	Dust suppressed cloth is now specified. No prospect seen of finding a substitute fire resistant material. Main applications are hangar fire curtains, curtains in magazines, and protection in way of welding and burning operations. Magazines will be separately compartmented in new construction and at long refits of existing ships. Glass–cloth is not acceptable for these usages.
Fire protection in magazines where jet efflux presents a potential hazard	Durestos (resin-bonded asbestos fiber)	No substitute material suitable for this purpose. Material is supplied by manufacturer to exact sizes required. There is therefore no health hazard in shipyard application.
Thermal insulation of hull structure	Sprayed limpet asbestos Blue-block asbestos or Amosite board	Deleted from specifications. Mineral fiber marine board, which is asbestos-free, is now specified. Any ships still insulated with sprayed limpet asbestos will require full implementation of D.C.I. 510/69 for delagging operations.
	Asbestos fiber and cloth for pipe covering	Deleted from specifications. Replaced by polyurethane or mineral fiber preformed sections with canvas covering, which are all asbestos-free.
Acoustic insulation of hull structure	Paxtiles, Paxfelt, Paxmarine	Deleted from specifications. Existing stocks are being kept for small repairs only. Replaced by mineral fiber resin bonded slab, which is asbestos-free.
	Amosite asbestos	Deleted from specifications. Replaced by mineral fiber marine board.
	Limpet asbestos board	Deleted from specifications. Replaced by perforated PVC sheet (Darvic).

High temperature jointing and packing materials	Asbestos fiber Compressed asbestos fiber	No substitute heat resistant material. No health hazard in forms used in shipyard applications.
Bearing materials brake linings	Asbestos reinforced plastics	No substitute wear-resistant material. No health hazard except if these materials are ground or worked (no known requirement for this).
Bathroom and galley deck coverings	Neoprene terrazzo	Asbestos-free neoprene terrazzo now available. Dockyards and overseers have been informed that this is the only acceptable material.
Partition bulkheads	Compressed asbestos sandwiched between metal, plywood, plastic sheets, etc. e.g. Marinite, Solastos	Deleted from specifications which now state that materials containing asbestos are not to be used. Steel, aluminum, or plywood will generally be used pending investigations into alternative asbestos-free materials.
Covers to bunk, settee and seat locker cushions and mattresses in submarines	Asbestos cloth (untreated, i.e. not dust-suppressed)	Deleted from specification. Fire retardant foam mattresses now approved.

Table 10.1. Asbestos Substitutes

Asbestos-Containing Materials	Asbestos-Free Alternatives	Comments
Moulded Asbestos (Amosite Asbestos Bonded with Sodium Silicate)	None	
85% Magnesia (About 15% Asbestos)	Asbestos-free magnesia	Ceiling temperature 316° C; one manufacturer only; colored pink to distinguish from asbestos-containing materials.
Calcium Silicate (About 15% Asbestos)	Asbestos-free calcium silicate	Ceiling temperature varies, generally 600° C.
High Temperature Insulating Block (About 15% Asbestos with Diatomite)	Vermiculite alumina cement block	Some calcium silicates may be suitable alternatives.
Plastics Compositions	Asbestos-free versions of magnesia and calcium silicate	Generally satisfactory for gap-filling and small areas.
Sprayed Asbestos and Asbestos Mineral Wool	1. Sprayed mineral wool 2. Sprayed ceramic fibers 3. Sprayed vermiculite cement and sprayed concrete	1. At development stage only 2. Limited experience, expensive 3. For fireproofing
Self-Setting and Hard-Setting Finishing Cement (up to 40% Asbestos)	1. Asbestos-free finishing cements 2. Plastics finishes applied in paste form and reinforced with glass cloth 3. Sheet finishes (metal, plastics, roofing felt, etc.)	1. May be subject to more cracking than asbestos-containing finishes 2. Colored if required. Less robust and generally more expensive than cement 3. Cheap for straight pipe lengths but expensive where bends and shapes involved
Board and Sheet	Ceramic fiberboard and sheet	Higher ceiling temperature, 1,260° C, than asbestos material; expensive
Rope	1. Glass fiber rope 2. Ceramic fiber rope 3. Silica fiber rope 4. Ceramic fiber felt strip	1. Ceiling temperature, 500°C 2. Ceiling temperature, 1,260° C; expensive 3. Ceiling temperature, 982°C; very expensive 4. May be cheaper alternative to ceramic rope in some cases

Table 10.1, continued

Asbestos-Containing Materials	Asbestos-Free Alternatives	Comments
Cloth, Tape, String, yarn, etc.	1. Glass fiber fabrics and yarn 2. Ceramic fiber and yarn 3. Silica fiber and yarn	1. Ceiling temperatures up to 500°C depending on type of glass. Some cloths may be unpleasant to handle. 2. Ceiling temperature, 1,260°C; expensive 3. Ceiling temperature, 982°C; very expensive

NOTE: Manufacturers have incorporated organic fibers in some of the materials that previously contained asbestos. Such materials may no longer be suitable for certain duties, e.g., where contamination with powerful oxidizing agents is possible.

Type	Product	Alternative	*Ratio of initial cost alternative/asbestos*	*Ratio of total cost in use alternative/asbestos* — *Interest rates %* 2½	5	7½	10	12½	15	*Comments*
1	Roofing	Plastic coated profiled steel sheeting	0·90	0·80	0·80	0·80	0·85	0·85	0·85	Includes effects of product on purlin spacing
2	Roof decking	Galvanised steel	0·40	0·35	0·35	0·35	0·40	0·40	0·40	
		Aluminium	0·50	0·35	0·35	0·40	0·40	0·45	0·45	
		Woodwork	0·80	0·60	0·60	0·65	0·65	0·70	0·70	
3	Cladding	Plastic coated profiled steel sheeting	0·90	0·80	0·80	0·80	0·75	0·75	0·75	Includes effects of product on sheeting rail spacing
4	Gutters	Cast iron	1·50	1·30	1·35	1·35	1·40	1·40	1·45	
	(a) Eaves gutters	Aluminium	1·00	1·00	1·00	1·00	1·00	1·00	1·00	
		PVC	1·25	0·90	0·95	1·00	1·05	1·10	1·15	
	(b) Valley gutters (box gutters)	Aluminium	2·00	1·45	1·50	1·55	1·60	1·70	1·80	
		Galvanised steel	2·00	1·70	1·70	1·75	1·80	1·85	1·90	
5	Ventilation ducts	See Type 14 following								
6	Flue pipes	(i) Light-gauge steel	0·65	0·85	0·80	0·75	0·75	0·70	0·70	(i) Replace at 20 years. Repaint at 5-year periods
		(ii) Cast-iron	1·65	1·20	1·30	1·45	1·50	1·55	1·60	(ii) No replacement. Repaint at 5-year periods
		(iii) Vitreous enamelled steel	3·00	1·85	2·20	2·40	2·60	2·75	2·81	(iii) No replacement. No paint. As compared with asbestos cement flue pipes. Replace at 20 years. No paint

Type	Product	Alternative	*Pipe*	*Pipe + Bed*	*Pipe + Bed + Trench*	2½	5	7½	10	12½	15	Comments
7	Drain pipes (150 mm)	(i) PVC with solvent joints	1·05	0·90	0·95	1·80	1·45	1·30	1·15	1·10	1·05	(i) Graded aggregate bed and surround. Replacement at 20 years. Total cost in use is based on pipe, bed and trench
		(ii) Clayware	1·05	1·05	1·00	—	—	—	—	—	—	(ii), (iii), (iv)—No replacement
		(iii) Cast-iron flex joints	2·50	1·65	1·30	—	—	—	—	—	—	
		(iv) Cast-iron lead joints	4·70	3·00	1·90	—	—	—	—	—	—	
	Drain pipes (300 mm)	(v) Concrete	1·20	1·10	1·10	—	—	—	—	—	—	

Type	Product	Alternative	*Ratio of initial cost alternative/asbestos*	2½	5	7½	10	12½	15	Comments
8A	Rainwater goods (100 mm gutter 64 mm pipe)	(i) PVC	0·80	0·70	0·70	0·70	0·75	0·75	0·75	Generally. Based on 3 parts gutter to 1 part pipe
		(ii) Aluminium	1·30	1·25	1·30	1·30	1·30	1·30	1·30	(i), (ii), (iii) Assumed replacement at the rate of 1/40 per annum
		(iii) Cast-iron	1·60	1·50	1·55	1·55	1·55	1·55	1·55	

Type	Product	Alternative	*Pipe*	*Pipe + Trench*	2½	5	7½	10	12½	15	Comments
8B	Water pipes (mains)	(i) Spun cast iron	2·00	1·40	—	—	-	--	—	—	No replacement

Type	Product	Alternative	Ratio of initial cost	Ratio of total cost in use	Comments
8C	Water tanks (50 gallon)	(i) Plastics	1·05	1·05 ⟶	All replaced at 25 years
		(ii) Galvanised steel	1·20	1·20 ⟶	Effect on *ratio*, of the different discount rates is negligible
		(iii) GRP	1·55	1·55 ⟶	

Type	Product	Alternative	Ratio of initial cost alternative/asbestos	Ratio of total cost in use alternative/asbestos — Interest rates % 2½	5	7½	10	12½	15	Comments
9	Sprayed asbestos insulation	—	—	—	—	—	—	—	—	No comparison valid as sprayed asbestos has not been normally available for last two years
10	Preformed insulation for piping	Glass fibre foil faced	0·95	—	—	—	—	—	—	Assuming similar rates of replacement in total cost in use ratio will not be significantly different from the rates of initial cost
11	Insulation board to partitions and ceilings	(i) Non-asbestos insulation board	1·15	—	—	—	—	—	—	Assuming similar rates of replacement (eg repair of damage in use), the total cost in use ratio will not be significantly different from the ratio of initial cost
		(ii) Plaster board and skim coat	0·80	—	—	—	—	—	—	
		(iii) Expanded metal and three coats plaster	1·65	—	—	—	—	—	—	
		(iv) GRG board	0·70	—	—	—	—	—	—	
12	Fire protection, fire breaks		As 11 above							
13	Acoustic material	(i) Acoustic plaster on brick or concrete backing	1·70	—	—	—	—	—	—	Assuming similar rates of replacement (eg repair of damage in use) the total cost in use ratio will not be significantly different from the ratio of initial cost
		(ii) Plasterboard and acoustic plaster	2·15	—	—	—	—	—	—	
		(iii) Expanded metal and acoustic plaster	2·70	—	—	—	—	—	—	
		(iv) Flaxboard	0·60	—	—	—	—	—	—	
14	Ducts	(i) Plywood	1·25	—	—	—	—	—	—	Assuming similar rates of replacement (eg repair of damage in use) the total cost in use ratio will not be significantly different from the ratio of initial cost
		(ii) Non-asbestos insulation board								
		(iii) Plasterboard and skim coat	As 11 above							
		(iv) Expanded metal and three coats plaster								
		(v) GRG board								
15	Floor tiles	(i) Vinyl	1·20	1·10	1·10	1·10	1·10	1·15	1·15	(i) Polish monthly, replace at 20 years
		(ii) Cork	1·70	2·85	2·70	2·60	2·45	2·35	2·25	(ii) Polish monthly, reseal 3-year periods, replace at 15-year periods
		(iii) Rubber	2·50	2·40	2·35	2·35	2·35	2·35	2·30	(iii) Polish monthly, replace at 15-year periods
		(iv) Linoleum	1·40	2·05	1·95	1·85	1·80	1·75	1·70	(iv) Polish monthly, replace at 10-year periods
		(v) Carpet	from 1·25	1·50	1·45	1·40	1·35	1·35	1·30	(v) Replace at 10-year periods
										As compared with vinyl asbestos tiles, polish monthly, replace at 20 years. Sweeping and washing hard coverings assumed equal to vacuum cleaning carpet

Type	Product	Alternative	Ratio of initial cost alternative/asbestos	Ratio of total cost in use alternative asbestos — Interest rates % 2½	5	7½	10	12½	15	Comments
16	Paint		Little or no cost effect by use of alternatives							
17	Rope, fillers									
18	Fibre									

Notes on Appendix B

1 The basis of pricing used in the Table is tender pricing in the third quarter of 1976. Where figures have not been available from tenders, published information regarded as comparable has been used instead.

2 The numbers shown in the Table represent the price of the alternative divided by the price of the asbestos-containing material it replaces. These comparisons are likely to remain reliable for a longer period than statements of actual prices.

3 Two sets of comparisons are given, the first in terms of initial cost only, the second in terms of costs-in-use. The latter set of comparisons takes account of discount rates ranging from 2½% to 15% in steps of 2½%.

4 No allowance has been made for inflation in the costs-in-use comparisons, and care should be taken in selecting an appropriate discount rate from those given to take this fact into account.

5 The costs-in-use comparisons cover a 35-year period, without allowance for replacement at the end of the term, value-added tax, company tax, development grants or the effect of the alternatives on fire insurance premiums. The assumptions regarding incidence of maintenance and replacement noted in the comments column of the Table are in the main based upon general experience rather than recorded data. It may be that other assumptions would be more appropriate in special cases, depending upon such factors as locality, social environment, type of building and standards of maintenance.

6 The alternatives considered have been limited to those that might be used without affecting in principle the structure supporting them. Where the alternative has affected the structure in detail but not in principle (eg where it has affected the sizes and/or spacings of purlins, sheeting rails, etc) the price of such detailed change has been taken into account in our calculations.

APPENDIX C Some Examples of Prices of Removing Asbestos-Containing Materials from Existing Buildings in DOE (PSA) Estate

A Removal of Sprayed Asbestos

1 SHREWSBURY 1976

Work: Isolate electrics, seal doorways, soak insulation, scrape off walls and soffites. Take all necessary precautions including protective clothing and bag and remove all waste.
Approx 65m² for £1175 (£18/m²)

2 BLETCHLEY 1975/76

Work: Carried out in Christmas Holiday period.
Remove sprayed asbestos from soffites, in accordance with the necessary safety precautions, and bag and remove all debris.
Approx 375m² for £4885 (£13/m²)

3 SOUTH EAST 1974

Work: Remove sprayed asbestos from soffites and replace with sprayed on mineral fibre insulation.
Approx £7·5/m²

4 VARIOUS SITES. MIDLAND REGION 1976

(a) *Work:* Stripping asbestos (non-crocidolite) from boilers and pipework and removal, all in accordance with safety regulations.
(i) Lump sum per installation £50·00.
(ii) Transport men and materials £0·30 per mile.
(iii) Stripping and removal £1·50/m².

(b) *Work:* Ditto but crocidolite asbestos.
(i) Lump sum £60·00
(ii) Transport £0·30 per mile
(iii) Stripping and removal £1·65/m²

5 VARIOUS SITES. MIDLAND REGION 1975

(a) *Work:* Stripping sprayed white asbestos and re-lagging with plastics.

	Stripping	*Re-lagging*
Boilers, etc	£1·71/m²	£11·42/m²
1-inch pipe	0·19/m	2·64/m
2-inch do.	0·27/m	4·32/m
3-inch do.	0·30/m	5·23/m
4-inch do.	0·30/m	6·85/m

(b) *Work:* Stripping sprayed white asbestos not in conjunction with re-lagging.

1-inch pipe	£0·30/m
2-inch do.	£0·42/m
2½-inch do.	£0·47/m

(c) *Work:* Stripping sprayed white asbestos from steel work in soffites.
£1·33/m².

6 RUISLIP 1976

Work: Removal of sprayed asbestos from a workshop and stores area involving extraordinary precautions to protect electrical and mechanical plant.
Total floor area 630m².

Included removal of sprayed asbestos on wood wool soffites extending over about half the floor area, and the removal of contaminated partitions, acoustic insulation and roof sheeting.

The complete cleaning down of all walls, floors and soffites.

Includes about 160m² of new roof sheeting.

Lump sum £7000.

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Chairman and Commissioners
Royal Commission on Matters of
Health and Safety Arising
From the Use of Asbestos
In Ontario,
180 Dundas Street West
22nd Floor
Toronto, Ontario
M5G 1Z8

March 6, 1981

Dear Sirs:

SUBMISSION OF THE ONTARIO HOSPITAL ASSOCIATION TO THE ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY ARISING FROM THE USE OF ASBESTOS IN ONTARIO

THE ONTARIO HOSPITAL ASSOCIATION

1. We are pleased to have the opportunity to make this submission to the Royal Commission on behalf of the Ontario Hospital Association (OHA) and its members.

2. OHA is a voluntary, non-profit organization which includes in its category of Active membership all 242 public hospitals in Ontario, along with the mental health centres run by the provincial government.

3. OHA represents hospitals on health matters, organizes education programs for health care personnel and joint hospital services, and provides to hospitals a number of direct consulting and advisory services. These include employee relations and occupational health and safety.

4. OHA's special Hospital Occupational Health and Safety Services department is one of the nine safety associations funded by the Workmen's Compensation Board of Ontario.

INTRODUCTION

5. Though it can be stated at the outset that we know of no cases of asbestosis or asbestos-related cancer among employees, hospitals in Ontario await with particular interest the results of this Royal Commission's study. We recognize the possibility that asbestos formerly used in construction of some hospital plants may pose a hazard to staff, patients and visitors. Naturally, hospitals will wish to take all necessary steps to eliminate asbestos hazards where they are shown to exist. Many have already done so.

6. The Ministry of Health has discouraged the use of asbestos in hospital construction since 1969, and the Ministry of Labour forbade its use as a fire retardant in 1973. We know, however, that there are still a number of hospitals in the province where asbestos is present as an insulator and/or a fire retardant.

OHA MEMBERSHIP SITUATION

7. In preparing this submission we invited hospital members to inform us of possible problem situations indicated by a review of their buildings in the light of Ministry of Health guidelines sent in 1980 (See Appendix A).

8. Very few hospitals have their own facilities to monitor levels of asbestos and for the purposes of their investigations most had to rely on the Ministry of Labour, a local university, or private laboratories.

9. Most of the 101 hospitals that contacted us stated either that they have no asbestos in their buildings, or that the type or form of asbestos is not considered to be a hazard in its present state.

10. There were some, however, that decided further action was warranted to prevent future hazard. A number of these have consulted the Ministry of Health for guidance, as outlined in the Guidelines in Appendix A. Hospitals taking this step are given a recommended sequence of actions to follow. These include contacting an architect or knowledgeable planning engineer to collect documentation for tendering purposes. The Ministry's current policy is to fund a substantial part of the bill incurred. Some hospitals have made their own arrangements and consulted architects or engineers independently.

11. Based on the hospital responses to our inquiry, and from discussions between hospital personnel and staff of our Occupational Health and Safety department, it is apparent that hospitals would benefit from authoritative advice and assistance on the subject. At present there is some confusion because of lack of standardization and specific direction with respect to remedies and safe alternatives.

QUESTIONS AND CONCERNS

12. We would now like to outline briefly for the Commission some of our unanswered questions and major concerns:

Costs of Removal of Asbestos

13. The costs of the removal of asbestos and the resulting renovations are high.

14. Hospitals with identified problems have been quoted by private contractors charges ranging from $25,000 to $150,000 for removal of the asbestos. This is clearly a financial burden that hospitals cannot shoulder alone. The Ministry of Health's current policy is to fund a substantial portion of these costs. We suggest that this should certainly be continued, and that the Government should consider paying the full costs of such renovations.

Availability of Monitoring Services

15. As stated, very few hospitals have on-site facilities to monitor asbestos levels. When the Ministry of Health sent out its Guidelines in April, 1980 (see Appendix A), most hospitals used the consulting services of the provincial Ministry of Labour. Currently, however, the Ministry of Labour is not structured to provide these resources on a routine basis. It is understandable that such routine work will not have high priority because the department is geared towards dealing with specific urgent situations or complaints, rather than with large numbers of requests for monitoring.

16. OHA recommends, therefore, that the Minister of Labour approve and regulate other facilities outside his Ministry for the regular monitoring of the levels of asbestos.

17. Under such an expanded, comprehensive program, OHA would wish to see testing standardized, with common criteria and similar equipment, thus providing a dependable measurement of the hazard in each environment. The present patchwork of services and agencies employed, and sometimes inconsistent advice on methods of removal and replacement, is causing confusion and uncertainty among hospitals. Presumably it applies among other employers as well.

Use of Asbestos Products

18. OHA hopes the Royal Commission will be able to provide guidance on hazards related to the use of asbestos-containing manufactured goods such as asbestos gloves and fire blankets which are currently used in hospitals and elsewhere. If they are not safe, hospitals will need substitute products. We would also like to have assurance that vinyl-asbestos floor tiles, asbestos ceiling tiles and asbestos/cement mixtures are safe for use in hospitals.

Effective Remedies

19. Hospitals are also anxious for clarification on the most effective remedies when asbestos is discovered. For example: what are the merits of the different methods of encapsulation and enclosure, and how safe are they, compared to complete removal? Is painting over surfaces a safe remedy?

Planning for the Future

20. The Ministry of Labour has taken an important step in making asbestos one of the seven substances designated under the Occupational Health and Safety Act. We are concerned that amidst the current controversy over asbestos, other potentially hazardous products are being ignored. We note that fibreglass, which has been one of the replacements suggested for asbestos, is now under suspicion itself of being the cause of health problems.

21. Those who design, build, use and work in hospitals, no less than their patients, look for assurance that the materials used in hospital construction do not constitute a threat to health. Such assurance should come from a central source with the research capabilities and regulatory authority to determine safe standards.

We recommend that the Ministry of Labour provide that service to safeguard the public's health.

Conclusion

22. We realize that our submission to this Royal Commission poses questions rather than offers solutions. However, hospitals, like other public institutions, are placed in an extremely difficult situation. The safety of staff, patients and visitors is always of paramount importance. At the same time, major renovations are very costly both in terms of money and in disruption to patient care. Before undertaking such work hospitals need to be assured firstly that a real hazard exists; secondly, that the measures they take will be appropriate and effective; and finally that they, the hospitals, will receive appropriate funding for the project.

Respectfully Submitted

Merritt G. Henderson
President
Ontario Hospital Association

Ontario

Ministry
of
Health

April 10, 1980

TO: ADMINISTRATORS OF ALL PUBLIC HOSPITALS

I am sure you are aware of concerns being expressed about the present and past use of asbestos in construction in Ontario and the possible impact on hospitals.

Since the establishment of the Ontario Hospital Services Commission over 20 years ago, hospital construction has been subject to specific guidelines and the use of non-bonded asbestos and other loose fibres in hospital buildings has been avoided.

This rule initially was designed to facilitate infection control by providing an environment which could be readily disinfected and cleaned on a systematic basis.

These concerns historically have meant that interior surfaces in hospital buildings have been finished with smooth, non-porous surface materials.

While this process normally eliminated the use of non-bonded asbestos, it has been specifically rejected by us over the past 10 years since concern about possible hazards from it has been recognized.

Despite this process, I think it would be useful if you would undertake an evaluation of your facilities to see whether any potential problem exists. To assist you and your staff, I attach a guideline prepared by the Ministry of Labour which describes the uses of asbestos in buildings and sets out procedures to be used for inspection and sampling.

If this presents any problems for you, please let me know so that our technical staff can advise you in dealing with it.

Yours sincerely,

J.R. Hagerman

J.R. Hagerman
Director
Institutional Planning Branch

Attach.

I N S P E C T I N G   B U I L D I N G S

F O R   A S B E S T O S

Prepared by Ontario Ministry of Labour
Occupational Health and Safety Division
December, 1979
Distributed by Ontario Ministry of Health

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PROCEDURES FOR THE INSPECTION OF ASBESTOS IN BUILDINGS

ASBESTOS AND HEALTH

Epidemiological studies of asbestos workers have shown that long-term exposure to asbestos increases the risk of developing lung cancer, mesothelioma (cancer of the lining of the lung and abdomen), and asbestosis (chronic lung disease). It is impossible to estimate confidently the exact degree of risk associated with low-level exposures. However, exposure to asbestos at any level is considered to present a health risk which increases with the duration and intensity of exposure.

The health effects of asbestos exposure do not become apparent immediately following exposure. The length of the latency period during which asbestos-related diseases develop is generally between 15 and 35 years from the time of the first exposure, depending upon the amount and duration of exposure.

The risk of developing asbestos-related diseases is increased considerably by cigarette smoking.

THE CONTROL OF ASBESTOS EXPOSURE IN BUILDINGS

The Use of Asbestos in Buildings

Asbestos is used in a variety of construction materials, principally applications where properties of heat resistance, fire-proofing and insulation are required. Products containing asbestos include reinforced asbestos cement, patching compounds, pipe insulation, fireproofing and decorative coatings.

Asbestos contained in building materials can become a health hazard when asbestos fibres are released into the air and inhaled. Many materials, such as vinyl floor tiles, will not release asbestos since the fibres are firmly encapsulated

within the body of the material. However, friable (i.e. crumbly) materials containing asbestos will release fibres when damaged.

The asbestos materials of concern in buildings are the friable materials used for fireproofing, insulation or decoration. Friable materials are usually found on overhead surfaces, steel beams, ceilings and occasionally on walls and pipes. Many of these coatings are applied by spraying or trowelling.

Generally the sprayed materials are more friable. However, materials applied by trowelling also can release asbestos fibres if the coating is damaged.

It is important to note that asbestos is released from damaged materials such as surface coatings or insulation. This release can be stopped by careful removal of all loose material, followed by the application of a sealing solution to the damaged surface, or the enclosure of the damaged area.

The Control of Asbestos Exposure

In order to ensure that asbestos does not present a health hazard in buildings, the following precautions should be taken:

(a) Buildings should be inspected to locate situations where asbestos material is damaged and exposed.
(b) Samples of the material should be carefully collected.
(c) The samples should be analyzed for asbestos.
(d) If the material contains asbestos, an exposure assessment should be carried out to determine whether an exposure problem exists.
(e) If an exposure problem is discovered, corrective action should be taken. Appropriate courses of action include removal, encapsulation, or enclosure of the asbestos-containing material.

(f) A list of locations where friable asbestos material is used should be kept up-to-date.

Each of these precautionary measures is discussed in more detail in the following sections.

PROCEDURES FOR INSPECTION OF ASBESTOS

A survey of buildings should be carried out initially by maintenance staff, in order to locate areas where asbestos is contained in building materials. These materials include spray coats in ceilings or steel beams for fireproofing, decorative coatings, and pipe insulation. Situations of particular importance are those where coatings are damaged.

A check of buildings and maintenance records should supplement visual inspections. However, record checks should not replace visual inspection in identifying asbestos material.

When it is suspected that asbestos is contained in building materials in any area, a location record should be started for future reference.

When damaged surfaces containing asbestos are located, a plastic drop sheet should be placed under the damaged area to catch released material. The surrounding area should be carefully vacuumed to capture fallen material. Warning signs should be posted and the area isolated.

Engineering staff should then be advised of the situation. Collection of samples for analysis should be taken immediately according to the instructions detailed below. Subsequent removal or repair of the coatings should be carried out by contractors and supervised by engineering staff.

COLLECTION OF SAMPLES FOR ANALYSIS

Sample Collection

A small sample (not more than a teaspoon in quantity) of suspected asbestos-containing material is required for analysis. The following precautions should be taken during sample collections:

(a) The material from which the sample is drawn should not be otherwise disturbed or damaged.

(b) The area around the damaged material should be sprayed with a light mist of water to prevent further damage and fibre release during collection.

(c) If pieces of the damaged material break off during sample collection, all floors and surfaces in the area should be vacuumed or cleaned with a wet mop.

(d) Only those persons involved in sample collection and clean-up should be present in the area, and suitable respirators should be worn. Shoes and clothing should be decontaminated by vacuuming. For more information on the respirators available, call the Occupational Hygiene Service, of the Occupational Health Branch at (416) 965-3150.

During the collection of samples, a plastic drop sheet should be placed below the damaged surface to catch the friable material released. If scraping is necessary, it should be done very gently with a thin metal spatula commonly used in the chemistry laboratory.

The sample of the suspect material should be placed in an airtight sample bag available from the Ministry of Labour, sealed and sent in the accompanying envelope to the following address:

Occupational Health Laboratory
Ministry of Labour
360 Christie Street
Toronto, Ontario M3G 3C2

The envelope should be clearly marked in the lower left-hand corner:

ASBESTOS INSPECTION PROGRAM

The form enclosed with the sampling pouch must be filled out. This form indicates where the final results of the sample analysis are to be sent. A sample reporting form is shown in APPENDIX I.

Exposure Assessment

When sample results indicate that asbestos is present, it will be necessary to assess the potential for release into the environment. This should be done by contractors or maintenance staff, using suitable respiratory equipment.

CORRECTIVE ACTION THAT SHOULD BE TAKEN TO CONTROL THE RELEASE OF ASBESTOS

If friable asbestos material is identified and exposure is occurring or is likely to occur, corrective action should be considered.

In deciding which course of corrective action provides the most efficient long-term solution, consideration should be given to the present condition of the materials containing asbestos, the location of this material, its function, and the cost of the proposed method of controlling asbestos exposure.

There are four basic approaches to controlling exposure:

(a) Removal: Asbestos material is removed and disposed of by burial.

(b) Encapsulation: Asbestos material is coated with a bonding agent called a sealant.

(c) Enclosure: Asbestos material is separated from the building environment by barriers such as suspended ceilings.

(d) Deferred action: No action is taken. The area is inspected periodically for changes in exposure potential.

Removal, encapsulation, and enclosure are corrective methods and can be used separately or in combination. Removal completely eliminates the source of exposure to asbestos, and therefore, offers a permanent solution. Both enclosure and encapsulation are containment methods which do not remove the source of asbestos exposure.

Since the asbestos material remains within the building following enclosure or encapsulation, these approaches should be considered only as a temporary control measure. The expected length of time before a building is to be demolished or major structural changes are to be made will be a factor in deciding whether to use either of these methods. If a building is later renovated or demolished, encapsulated and enclosed asbestos material should be removed and disposed of by methods acceptable to the Ministry of Labour and the Ministry of Environment.

The following explains each of the above corrective measures in more detail:

(a) Removal

For removal, all the asbestos material is taken off the underlying surface, collected and placed in containers for burial in an approved waste disposal site. This process may require interruption of building activities.

Fireproofing material which has been removed should be replaced immediately to maintain compliance with fire and building codes. If the asbestos material fulfilled either an insulating or acoustical function, a replacement material should have similar characteristics.

(b) Encapsulation

For encapsulation, the asbestos material is coated with a bonding agent called a sealant. Sealan' penetrate and harden the asbestos

material (penetrants) or cover the surface of the material with a protective coating (bridging sealants). The sealant prevents fibre release from the asbestos material.

Sealants are applied over the surface of the material using airless spray equipment at a low pressure setting. Airless equipment reduces the pressure of the sealant spray and the impact upon the friable asbestos material surface, thus reducing fibre release during application.

Encapsulation should be limited to areas where the asbestos containing material will not be subject to further damage by contact. This factor may preclude the use of encapsulation as a corrective measure in many areas since activity in the buildings may result in contact with treated surfaces and subsequent damage. Encapsulation should also be limited to asbestos material which is capable of supporting the additional weight of the sealant.

Encapsulated material should be routinely inspected for deterioration or damage.

Sealants found satisfactory for asbestos encapsulation are listed in APPENDIX II.

(c) Enclosure

For enclosure, a barrier such as a suspended ceiling is constructed between the asbestos material and the building environment. Since the asbestos material has not been removed, fibres will continue to be released and will accumulate behind this barrier. When the enclosure is damaged or entered for maintenance, this accumulation may be released into the building environment.

(d) Deferred Action

In the event that action is deferred, a continuing inspection program should be implemented. The asbestos material should be routinely checked for deterioration or damage. If the condition of the material changes so that fibres are being released and contaminating the building environment, corrective action should be considered.

ACTION THAT SHOULD BE TAKEN TO PREVENT FUTURE EXPOSURE

Encapsulation, enclosure, and deferred action allow the asbestos material to remain within the building. It is important to recognize, therefore, that the risk of hazardous asbestos exposure may be increased by changing conditions in the building. For example, asbestos material can be damaged by maintenance, repair or renovation activities, causing further fibre release.

Consequently, a management system should be implemented to ensure that asbestos is not released into the building environment due to maintenance, renovation, or repair work performed by either building personnel or contractors.

All individuals involved in such activity should be informed that asbestos material is present and trained in work procedures to prevent damage to material containing asbestos.

Generally, it is not necessary to close a building in order to take corrective action. However, areas or rooms where there is a severe exposure hazard may have to be closed off until corrective action is taken. Usually this situation arises when there is a potential for high contamination levels of asbestos caused by continuing damage of highly friable material.

APPENDIX I

ASBESTOS INSPECTION PROGRAM

NAME OF PERSON TO RECEIVE
THESE RESULTS:

NAME OF BUILDING:

ADDRESS:

PERSON IN CHARGE OF BUILDING:

TELEPHONE NUMBER:

NO. OF SAMPLES SUBMITTED:

SAMPLING LOCATIONS	SAMPLE #	DATE SAMPLED

RESULTS

SAMPLE #	PRESENCE OF ASBESTOS

APPENDIX II

SEALANT MATERIALS TESTED BY BATTELLE LABORATORIES FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND FOUND SATISFACTORY FOR ASBESTOS ENCAPSULATION

Material	From
Decadex Firecheck	Pentagon Plastics 7659C Fullerton Rd. Springfield, Va. 22153 Tel: 703-569-5277
554-21-1	H. B. Fuller Company Foster Division Box 625 Springhouse, Penn. 19477 Tel: 215-628-2600
X-64-2 Also known as OX line ABC sealer	Lehman Bros. Corp. 22 Halladay Street Jersey City, N. J. 07304 Tel: 201-434-1882
Cafco Bond Seal	United States Mineral Products Co. Flanders Road Stanhope, N. J. 07874 Tel: 201-347-1200
K-13 Sprayed Cellulose	National Cellulose Corporation 12315 Roben Blvd. Houston, Texas 77045 Tel: 713-433-6701
Pleco-glo	Makus Development Corporation P. O. Box 31 Mercer Island, Belleview Washington Tel: 206-641-7373

. WILSON PROCESS EQUIPMENT LIMITED / P.O. Box 820, Bolton, Ontario, Canada • L0P 1A0 / Phone (416) 851-1211
857-1511

58

March 3, 1981

Royal Commission on Asbestos
180 Dundas Street West,
22nd Floor,
TORONTO, Ontario
M5G 1Z8

Reference: Various papers covering study on asbestos fibres relating to their use in filtration of beverages

Attention: Linda Kahn

Dear Ms. Kahn;

As mentioned during our phone conversation of February 10, 1981 we have enclosed following papers pertaining to use of asbestos as a filter media in the clarification of beverages:

- English translation of report concerning asbestos filters translated from The German Brewery Journal - Brauwelt Jg. 115, No. 12, dated March 20, 1975. Original German article attached.
- Paper covering study carried out by the University of Laval of Quebec in co-operation with Societe Des Alcools du Quebec 1979 - French language.
- Paper prepared by Institut fur Lebensmitteltechnologie - Frucht - und Gemusetechnologie - der Technischen Universitat Berlin (independent report - German language)
- Paper prepared by Prof. Dr. H. H. Dittrich of the Institut fur Mikrobiologie und Biochemie in Geisenheim am Rhein (independent report prepared in English language.

We are involved in the supply of filter media (mainly filter sheets) used in the clarifying and sterile filtration of wines and other beverages. We are very concerned with the position taken by the "Media" and Consumers Association of Canada, article published in their June 1977 magazine and now with the Ontario Government. In our own small way we have been collecting data since the initial "scare" in 1977. We have been unable to acquire any details found in tests to indicate asbestos fibres taken orally are harmful?

With this being the case, and with the publicity surrounding "asbestos" generally, it annoyes us that the question of asbestos filtration media (particularly fibre-proof filter sheets) are recommended to not be used in the Province of Ontario. So much has been said about this subject, without any substantial proof evidence, that the general public is now questioning if in fact asbestos is used in the filtration of Ontario produced wines?

O. WILSON PROCESS EQUIPMENT LIMITED / P.O. Box 820, Bolton, Ontario, Canada • L0P 1A0 / Phone (416) 851-1211
857-151

March 3, 1981

Royal Commission on Asbestos
Attention: Linda Kahn

Wine filtration in each and every major wine producing country of the world is, to our knowledge, using the finest filtration material available - "asbestos", and their respective products are being imported into the Province of Ontario and sold through our LCBO to the public. But it's a no, no for Ontario wineries to use this identical material to filter their wines? WHY?

The Ontario wineries are forced to use cellulose materials which are not nearly as efficient, and follow up by employing membrane filters prior to bottling. This is a far costlier method of obtaining the same end result, and a frustrating procedure to say the least.

We look forward to a well publicized and final clarification of this particular subject - backed up by circumstantial evidence. The public, and those involved in the filtration media industry deserve this clarification.

We do trust the enclosed papers may be of some assistance in your arriving at a decision pertaining to this subject. We would ask that we be kept informed as to the final position taken in this matter.

Yours truly,

A. O. WILSON PROCESS EQUIPMENT LIMITED

A. Ross Wilson

ARW/w.w.
(Encl'd)

per A. Ross Wilson

O. WILSON PROCESS EQUIPMENT LIMITED / P.O. Box 820, Bolton, Ontario, Canada • L0P 1A0 / Phone (416) 851-1211

THIS IS AN ENGLISH TRANSLATION OF REPORT CONCERNING ASBESTOS FILTERS, TRANSLATED FROM THE GERMAN BREWERY JOURNAL - Brauwelt Jg. 115 (1975) Nr. 12, 20 MARZ.

Please note complete German transcript is attached:

The world use of asbestos filter processes for the filtering of drinking liquids has reached the 23 million mark; of which, 15 million are used in the wine sector. Six million are used in the brewing industry.

It is interesting to note that from all the asbestos production only .1% goes into the filter layer production. Recently many people have come to believe that this asbestos filtration of water and other liquids may be a contributing factor to certain types of cancer. With electro-microscopic studies, it has been found that asbestos particles go into the product and consequently into the consumer. Scientists have proven though with laboratory animal studies that this belief about cancer is untrue. Scientists introduced a high dosage of asbestos into the animals and NOTHING was found in the organs twenty-four hours later.

It is interesting to note that today's filtration processes preserve most of these asbestos particles-whether they are believed to be harmful or not. This is done through even finer filtration which allows little if any asbestos particles to escape.

The finer European beers and wines would not have their fine high quality if it were not for asbestos filtration processes which they are put through. The only alternative to this filtration is a membrane filter and it would not yield the product as pure or as high in quality as beers and wines on the market today.

Brauwelt-Report

Zur Unbedenklichkeit asbesthaltiger Filtermittel

Der Welt-Jahresbedarf an asbesthaltigen Filterschichten zur Filtration von Getränken hat heute etwa 23 Mio. m² erreicht, wonach schätzungsweise ca. 15 Mio. m² auf den Weinsektor und ca. 6 Mio. m² auf die Brauindustrie entfallen. Vom gesamten Asbestaufkommen gehen allerdings nur ca. 0,1 % in die Filterschichtenproduktion.

Verschiedentlich tauchten nun in letzter Zeit Mutmaßungen in Richtung auf eine mögliche krebserzeugende Wirkung kleinster Asbestfasern auf, die evtl. mit schichtenfiltrierten Getränken oder Wasser in den menschlichen Körper gelangen. Anlaß gaben in erster Linie Befunde aus elektronenmikroskopischen Untersuchungen, die anscheinend „starre Asbestnadeln" in Organteilen und Flüssigkeiten aufzeigten. Es wurden Gedankenverbindungen zur sog. Lungen-Asbestose angestellt, die bei berufsbedingtem langjährigem Einatmen von Asbeststaub auftreten kann.

Diese Verdachtsmomente konnten inzwischen wissenschaftlich widerlegt werden. Mit einer Aussprache unter Wissenschaftlern einschlägiger Hochschul- und Fachinstitute, der sich eine Informationstagung für die Fachpresse anschloß, haben nun die Seitz-Filter-Werke als weltweit orientierter Filterschichtenhersteller eine Aufklärungsoffensive unternommen, um die verschiedentlich eingetretene Verunsicherung auszuräumen. Einem Referat von Prof. Dr. H. J. Bielig (Institut für Lebensmitteltechnologie der TU Berlin) war dabei zum neuesten Stand der Erkenntnisse u. a. folgendes zu entnehmen:

Im flüssigen Lebensmittel erfolgt in der Regel eine Festigkeitsveränderung der Asbestfaser, so daß ihre eventuelle mechanische Schädlichkeit von vornherein nicht mehr wirksam ist.

In schwachsauren Lebensmitteln (Bier, Wein, Fruchtsäfte usw.) erfolgt eine Festigkeitsschädigung der Faser, die bis zu 100 % gehen kann. Es liegt dann nur noch ein lockeres Kieselsäure-Gel vor, welches ohne jede mechanische Wirkung bleiben muß.

Elektronenoptische Aufnahmen lassen dieses Phänomen der Reduzierung der mechanischen Festigkeit nicht erkennen, weil das Hauptgitter des Kristalles unverändert erhalten geblieben ist.

Überhohe Dosen von Chrysotilfasern, die Laboratoriumstieren oral verabfolgt wurden, erbrachten nicht den geringsten Hinweis auf eine mögliche krebserzeugende Wirkung der Asbestfasern im Magen-Darm-Bereich.

Bei einer einzigen hohen Dosis wurden die Fasern von den Tieren innerhalb von 48 Stunden ausgeschieden, und nach einer Woche waren im Gewebe der Tiere keine Faserreste mehr zu entdecken.

Die gedankliche Verbindung zwischen der Asbestose, der berufsbedingten Lungenerkrankung bei Asbestarbeitern und Mesotheliomen wurde in unzulässiger Weise mit der möglichen oralen Aufnahme von Asbestfasern in Beziehung gebracht.

Zu erwähnen ist auch noch die heute bei hochwertigen Filterschichten übliche glanzseitige Verfestigung (Imprägnierung), die eine Abfaserung weitestgehend verhindert. Einleitend hatte Prof. Dr. Bielig angedeutet, daß die Filtrationswirkung asbesthaltiger Schichten anderweitig nicht erzielbar ist, auch nicht durch Einsatz mineralischer Faserstoffe wie Glasfasern, Kaliumtitanatfasern u. dgl., deren physiologische Konsequenzen außerdem Beachtung verdienen.

Einhellig wurde von den anwesenden Brauereifachleuten im übrigen die Ansicht vertreten, daß zumindest für europäische Biere und auch für viele überseeische eine Feinklärung bzw. Entkeimungsfiltration mit Membranfiltern (reine Siebwirkung, minimales Trubstoffaufnahmevermögen, Verblockung in kürzester Zeit) praktisch unmöglich ist.

CONNAISSANCE
DE LA VIGNE ET DU VIN
N° 3 - 1979

L'AMIANTE DANS LES BOISSONS

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Connaissance Vigne Vin, 1979, 13, N° 3, 219-227.

L'AMIANTE DANS LES BOISSONS

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INTRODUCTION

Dans un jugement rendu le 18 janvier 1978, un tribunal de Paris a rejeté l'action en dommages et intérêts pour préjudice considérable intentée, par un groupe de sociétés de commerce des vins, à l'Union fédérale des consommateurs et à sa revue, *Que Choisir*, pour la parution d'articles («De l'amiante dans votre vin», octobre 1976), dans lesquels on incriminait les plaques filtrantes contenant de l'amiante pour les teneurs en fibres dans les vins de consommation courante. La publicité qui a entouré ce procès (l'amiante et le vin, Le Monde 3 décembre 1977) et le jugement qui en a découlé sont de nature à donner l'impression au consommateur que, d'une part, la demande, dès 1976, de l'interdiction immédiate de l'usage de l'amiante pour la filtration des boissons par la revue *Que Choisir* était pleinement justifiée et que, d'autre part, la preuve scientifique des risques cancérigènes de l'ingestion d'amiante était irréfutable.

Au Canada, *Le consommateur canadien*, dans son numéro de juin 1977, faisait état des résultats d'une étude effectuée sur une quinzaine de vins de diverses origines. Le nombre de fibres trouvées variait de 50 mille à 2 millions par litre. La Régie des alcools de l'Ontario avisait ses fournisseurs quelques mois plus tard que le gouvernement canadien interdirait l'importation de boissons filtrées sur plaques contenant de l'amiante.

La Société des alcools du Québec (S.a.Q.) a alors décidé de vérifier si sa technique de filtration sur plaques d'amiante pouvait introduire des fibres dans les vins dont elle fait la mise en bouteilles. De plus, la S.a.Q. a commandé une étude comparative de la teneur en amiante dans diverses boissons. Nous présentons ici les résultats de ces études réalisées par le service du Contrôle de la qualité de la S.a.Q. en collaboration avec le

METHODES DE DETERMINATION DE L'AMIANTE

1- Identification et comptage des fibres d'amiante par microscopie électronique.

Le microscope électronique couplé à un système de rayons X permet l'identification de fibres individuelles d'amiante. Cependant cette technique comporte certaines difficultés. Ainsi, les membranes utilisées pour filtrer et recueillir les fibres contiennent, selon le microscope électronique, un certain nombre de fibrilles. D'autres part, puisqu'il s'agit de mesures à caractère statistique, la concentration de fibres, le bruit de fond et les erreurs statistiques jouent un rôle important dans la précision et l'exactitude des résultats. De plus, il a été démontré que les résultats d'échantillons semblables, analysés dans différents laboratoires, pouvaient varier d'un facteur 2 à un facteur 109. Par exemple, les valeurs moyennes sur des échantillons analysés simultanément dans trois laboratoires différents (HARWOOD et YAMATE, 1975) ont varié de 2 à 17 et 30 millions de fibrilles par litre. Cette technique possède une limite de sensibilité voisine de 50 mille fibres par litre et requiert beaucoup de temps et de grandes précautions. Bien qu'elle permette d'obtenir le nombre approximatif de fibrilles, le poids de ces fibrilles ne peut pas être obtenu facilement et elle ignore totalement les particules non fibreuses qui pourraient être également nocives.

2- Méthode de dosage proposée.

La méthode analytique que nous avons utilisée est basée sur la distribution naturelle et la solubilité dans l'eau des composés magnésiens. Seuls les silicates de magnésium sont insolubles dans l'eau. Ils appartiennent soit à la famille des serpentines (chrysotile, talc, antigorite) soit à celles du pyroxène ou des amphiboles. Puisqu'il est plutôt probable de trouver, en suspension dans l'eau, de fines particules de serpentine que des particules des autres silicates de magnésium, ceci en raison de leur faible densité et de leur concentration dans la croûte terrestre, toute quantité de magnésium particulaire observée dans une boisson peut être reliée à une quantité maximale de silicate de magnésium. On peut donc estimer ainsi la concentration maximale en serpentine ou en chrysotile.

L'utilisation de cette méthode globale plutôt que celle limitée au dénombrement des fibrilles se justifie en partie à cause de sa simplicité et de la possibilité de son application à des études comparatives. Elle présente aussi l'avantage de donner la teneur totale en particules magnésiennes. Cette dernière donnée est importante si on se rapporte à quelques faits scientifiques troublants : le taux de mortalité élevé provoqué par le cancer d'estomac chez les japonais a été relié à l'emploi du talc (non-fibreux) pour le traitement du riz (MERLISS, 1971); les échantillons censément purs de l'Union internationale contre le cancer (U.I.C.C.) ne contiennent que de 70 à 80 p. 100 de chrysotile, le restant étant, d'après les

résultats du laboratoire de chimie minérale et analytique de l'Université Laval, de la poussière d'antigorite (non fibreuse); une variété d'amiante qui contenait peu de fibres et beaucoup de matières granulaires a montré une grande activité cancérigène (WAGNER et *al.*, 1973).

Bien que SELIKOFF (1976) ait démontré que l'amiante était dangereux au niveau de l'appareil respiratoire, des travaux récents (BIELIG et *al.*, 1976) semblent indiquer que le danger est pratiquement inexistant au niveau de l'appareil digestif.

L'estimation de la quantité maximale d'amiante par la méthode du magnésium particulaire permet de juger de la qualité d'un système de filtration à différents stades et permet d'établir l'efficacité de la filtration pour éliminer toutes les particules d'une boisson mise en bouteilles.

Mode opératoire. Un litre du liquide à analyser est filtré sur membrane de polytétrafluoroéthylène (Millipore FHLP 04700) dont l'ouverture des pores est inférieure à 0,45 µm. La membrane est mouillée avec une solution d'éthanol à 94 p. 100. Les particules magnésiennes retenues sur la membrane sont reprises par 10 ml d'une solution d'acide chlorydrique 0,1 N et digérées à chaud dans un contenant étanche sur bain-marie pendant 2 heures Cette digestion libère totalement le magnésium de ses composés.

Le magnésium est ensuite dosé par absorption atomique avec un spectrophotomètre PERKIN-ELMER modèle 305 avec flamme air-acétylène. La lecture est prise directement en mg/l par comparaison avec des étalons connus de magnésium, à la longueur d'ondes de 285,2 nanomètres. La solution étalon de magnésium est de 0,25 mg/l. La précision des lectures est de + — 5 p. 100. La teneur en magnésium multipliée par quatre donne la teneur en chrysotile.

La limite inférieure de détection (lecture sur l'appareil) est de 10 µg/l avec une linéarité de la courbe de 0 à 250 µg/l.

Il est à remarquer que l'attaque acide produit toujours un résidu de silice sans structure fibreuse et que la digestion par les acides de l'estomac devrait produire à peu près le même effet.

RESULTATS

1- Etude de la filtration.

Les plaques industrielles utilisées sont du type EK de Seitz et contiennent jusqu'à 50 p. 100 en poids d'amiante chrysotile. Elles possèdent du côté de la sortie une substance plastique qui a pour fonction de retenir une partie des fibres constituantes (BIELIG et *al.*, 1976).

La mise en service de nouvelles plaques s'effectue d'abord par un lavage à l'eau chaude pendant quinze minutes suivi d'une stérilisation

à la vapeur (à 0,3 kg/cm2 de pression) pendant dix minutes. Le vin ou le liquide à filtrer est ensuite recyclé durant une trentaine de minutes. Il s'ensuit un colmatage des plaques et l'élimination des fibrilles qui étaient peu retenues dans les mélanges filtrants.

Tous les tests ont été effectués à l'aide de filtres ORION-40 de Seltz avec un châssis de cent plaques. Le débit maximum des filtres n'est jamais supérieur à 3000 l/h et la pression différentielle n'excède pas 1,5 kg/cm2.

Dans le tableau I, on observe un abaissement marqué de la teneur maximale estimée de chrysotile entre les liquides avant et après la filtration sur plaques du type EK contenant de l'amiante. On constate également qu'une circulation du liquide pendant trente minutes suffit à rendre ces plaques efficaces.

TABLEAU I

Variation de la teneur maximale estimée en chrysotile en fonction du temps de filtration sur plaques contenant de l'amiante (plaque EK, Seitz).

Les teneurs sont exprimées en µg/l.

Teneurs avant filtration { vin blanc = 6,0 ; vin rouge = 14,0
vodka A = 12,0 ; vodka B = 2,0

Temps de filtration (minutes)	Vodka (A)	Vodka (B)	Vin blanc	Vin rouge
1	12,0	—	—	4,0
5	—	0,8	3,2	—
10	—	0,4	—	4,8
15	3,2	0,4	2,0	—
30	1,2	0,4	1,2	2,8
60	—	0,4	1,2	3,2

La diminution en magnésium particulaire qui résulte de cette filtration est certes incompatible avec un accroissement en fibres qui proviendraient des plaques d'amiante. Puisque toute les opérations de filtration de la S.a.O. comportent une circulation du liquide de trente minutes, on devrait s'attendre à ce les produits mis en bouteilles contiennent un minimum d'amiante. De fait, des cinq vins français dont l'analyse donnée par «Le consommateur canadien», celui qui présente le plus petit nombre de fibrilles d'amiante est celui importé et mis en bouteilles par la S.a.O.

TABLEAU II

Teneur maximale estimée en chrysotile de différents vins

Lieu de mise en bouteilles	Marque	Teneur en chrysotile µg/l	Lieu de mise en bouteilles	Marque	Teneur en chrysotile µg/l
		Vin blanc			
Afrique du Sud	Paarl Riesling	2,4	Espagne	Yago-Condal	2,8
Allemagne	Black Tower	3,2	France	Rince-Daille	3,2
Autriche	Lenz Moser	3,2	France	Vieux-Château	3,6
Canada	Chantilly*	1,6	Grèce	Roditys	0,8
Canada	Geloso*	1,6	Italie	Bianchi	1,6
Canada	Prince Blanc*	2,4	Italie	Frascati	3,2
Etats-Unis	Emerald Dry	3,2			
		Vin rouge			
Canada	Chambord*	1,2	France	Pourpreuil	2,4
Canada	Chanteclerc*	0,8	France	Royal Kébir	3,2
Canada	Réserve du Cellier*	3,2	Hongrie	Sec Hardi	12,0
Canada	Valpolicella*	2,0	Italie	Chianti Ruffino	2,0
France	Côtes-du-Rhône	3,2	Italie	Gamze	2,0
France	Cabernet-Sauvignon	10,0	Yougoslavie	Kastelet	3,6
France	Lichette	4,0			

* Vins mis en bouteilles au Canada (Québec) après filtration sur plaques contenant de l'amiante.

De plus, le nombre des fibrilles dans ce vin est quatre fois plus petit que le moins «contaminé» des autres vins mis en bouteilles en France.

Il apparaît donc excessif de demander l'interdiction de ces plaques contenant de l'amiante alors qu'une technique d'utilisation adéquate leur permet d'être très efficaces.

2- Etude comparative de la teneur en amiante de diverses boissons.

De façon à comparer la qualité amiantine des produits mis en bouteilles par la S.a.Q. avec celle d'autres boissons semblables mais importées en bouteilles, nous avons dosé le magnésium particulaire et estimé la teneur maximale de chrysotile de nombreuses boissons. Dans tous les cas deux échantillons ont été analysés. Sauf dans les échantillons où la teneur estimée excède 5,0 µg/l, l'écart entre les deux déterminations est inférieur à 50 p. 100.

TABLEAU III

Teneur maximale estimée en chrysotile de différentes boissons

Type	Marque	Lieu de mise en bouteilles	Teneur en chrysotile µg/l
Brandy	Brandy français*	Canada	0,8
Cognac	Rémy-Martin	France	1,6
Gin	Beefeater	Angleterre	0,4
Vodka	Kamouraska*	Canada	1,2
Vodka	Moskosvkaya	Russie	10,0
Liqueur	Dambruie	France	2,4
Liqueur	Grand-Marnier	France	12,0
Apéritif	Prince of Denmark	Danemark	5,2
Apéritif	Dubonnet	France	5,2
Apéritif	Saint-Raphaël	France	5,6
Apéritif	Cinzano sec	Italie	0,8
Apéritif	Martini et Rossi	Italie	0,4
Sherry	Sherry australien	Australie	3,6
Sherry	Granada*	Canada	3,6
Sherry	Branvin	Canada	6,0
Cidre	Le Boulé*	Canada	2,0
Jus de pomme	Allen's	Canada	20,0

* Boisson filtrée au Canada (Québec) sur plaques contenant de l'amiante.

La limite de sensibilité de la méthode étant d'environ 0,4 µg de chrysotile par litre (0,1 µg de magnésium par litre), tout échantillon dont la teneur estimée est inférieure à 1,0 µg de chrysotile par litre pourrait être considéré pratiquement exempt d'amiante.

Les tableaux II et III donnent une liste des boissons analysées selon leur type et leur lieu d'origine.

On remarque que les boissons filtrées au Québec sur plaques d'amiante contiennent, en général, moins de magnésium particulaire que les boissons importées. On note toutefois que les eaux d'alimentation du Québec (tableau IV) contiennent, par contre, beaucoup plus de magnésium que les boissons alcooliques. Puisque les eaux naturelles sont en contact avec des roches serpentines et que ces dernières contiennent du chrysotile, il est normal de trouver des fibrilles d'amiante dans les eaux d'alimentation. Une étude au microscope électronique a démontré que les eaux de consommation de Montréal et de Toronto contiennent de 2 à 5 millions de fibrilles d'amiante par litre (CUNNINGHAM et PONTEFRACT, 1971), alors que d'autres travaux ont montré que les eaux du lac Supérieur

TABLEAU IV

Teneur maximale estimée en chrysotile de différentes eaux du Canada

Lieu de mise en bouteilles	Type	Teneur en chrysotile µg/l
	déminéralisée	0
Québec	consommation	40
Montréal	consommation	8
Sainte-Foy	consommation	16
Sainte-Foy	Fleuve St-Laurent	40
Sillery	consommation	24

contiennent jusqu'à 80 millions de fibrilles par litre (DURHAM et PANG, 1976). La méthode du magnésium particulaire donne des valeurs estimées de chrysotile qui, sans être reliées par un facteur simple au nombre de fibrilles observées par microscope électronique, permettent néanmoins de classer les boissons analysées selon le même ordre de qualité amiantine.

Parmi les vins rouges le Sec Hardi contient près de 2 millions de fibrilles selon la détermination du microscope électronique et au maximum 12 µg de chrysotile par litre selon la méthode du magnésium particulaire, alors qu'un Bordeaux mis en bouteilles au Québec ne contient que 0,6 millions de fibrilles et moins de 2 µg de chrysotile par litre.

CONCLUSION

La campagne de publicité condamnant l'utilisation de plaques d'amiante paraît, à notre avis, ne s'appuyer sur aucune preuve concrète. Bien au contraire, l'utilisation adéquate des plaques d'amiante réduit systématiquement le nombre de particules et de fibrilles dans les boissons filtrées et la qualité générale de la filtration est supérieure à l'utilisation des plaques sans amiante. (SERRANO et GUIMBERTEAU, 1978).

A la lumière de nos résultats d'analyse il semblerait que la grande majorité des boissons contiennent peu de particules et de fibrilles et qu'elles sont moins contaminées que l'eau de consommation.

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RÉSUMÉ

La détermination du magnésium particulaire est utilisée afin d'étudier la concentration en amiante chrysotile dans les boissons.

Il est démontré d'une part que la teneur en magnésium particulaire peut diminuer considérablement par filtration sur plaques contenant de l'amiante et d'autre part que la majorité des boissons alcooliques contiennent peu de fibrilles d'amiante et qu'elles sont moins contaminées que l'eau de consommation.

SUMMARY

The magnesium particle determination is used in order to study the concentration of Asbestos (chrysotil) in beverages.

On the one hand, it gives a clear indication that the content of magnesium particle can diminish considerably, using asbestos filtration pads. On the other hand, the majority of alcoholic beverages contains few asbestos fibres and they are less contamineted than drinking water.

ZUSAMMENFASSUNG

Die Bestimmung der Magnesiumpartikel wird angewandt, um die Konzentration an Chrysotilasbest in den Getränken zu untersuchen.

Es wird aufgezeigt, dass der Gehalt an Magnesiumpartikel sich beträchtlich vermindern kann durch Filtration über Platten, die Asbest enthalten, und weiterhin, dass die Mehrheit der alkoholischen Getränke wenig Asbestfasern enthalten, und dass sie weniger verseucht sind als da Trinkwasser.

RESUMEN

La determinación de magnesio se utiliza para conocer la concentración de amianto crisotilo en las bebidas.

Se ha demostrado por una parte que el contenido en magnesio puede disminuir considerablemente por filtración sobre placas que contengan amianto y por otra parte que, la mayoria de las bebidas alcoholicas contienen pocas fibrillas de amianto, incluso menos que el agua potable.

RIASSUNTO

La determinazione del magnesio in particelle, è utilizzato per studiare la concentrazione in amiante crisotile nelle bevande.

E dimostrato, da una parte, che il contenuto di magnesio in particelle può scemare cospicuamente con una filtrazione su placche che contengono amiante. D'altra parte, è dimostrato che la maggioranza delle bevande alcooliche contengono poche fibrille d'amiante.

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Über die Aufnahme von Asbest durch Getränke

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Einleitung

In den letzten Jahren erschienen in Zeitungen und Zeitschriften und auch in der Fachpresse immer wieder Meldungen, die auf Gefahren für die menschliche Gesundheit durch die Aufnahme von Asbest aufmerksam machten.

Durch diese Berichte ist eine gewisse Unsicherheit vor allem bei getränkeabfüllenden Betrieben entstanden. Es erhob sich die Frage, inwieweit Getränke mit Asbestfasern kontaminiert sein können und ob die Verwendung von asbesthaltigen Filterschichten, wie sie seit Jahrzehnten zur Filtration von Getränken verwendet werden, eine zusätzliche Quelle der Kontamination sein könnte.

Als Asbest werden mineralogisch unterschiedliche Arten feinfaserig kristallisierender Silikate bezeichnet (ULLMANN, 1955 und BERGER, 1961). Für Filterschichten wird ausschließlich der zur Serpentinasbestgruppe gehörende Chrysotil mit der vereinfachten Formel $Mg_6[(OH)_8Si_4O_{10}]$ verarbeitet (bis zu max. 50 Gew. %).

Möglichkeiten der Aufnahme von Asbest

Zur Klärung dieser Probleme muß nach unserer Ansicht zunächst streng unterschieden werden, auf welchem Wege der menschliche Körper die Asbestfasern aufnimmt. Es kommen drei Möglichkeiten in Frage:

1. Die Aufnahme über die Atemwege (pulmonal).

Hier sind vor allem Asbestarbeiter gefährdet, bei denen Asbestose und Asbestose mit Lungenkrebs als Berufskrankheiten von den Berufsgenossenschaften anerkannt werden (seit 1936 bzw. seit 1943). Bei dem im Gefolge der Asbestose in einigen Fällen auftretenden Lungenkrebs handelt es sich meist um ein Mesotheliom, also einen Tumor des Mesotheliums. Als Mesothelium bezeichnet man die Zellschichten zwischen Lunge und Brustwand, die durch ihre Ausscheidung für die reibungslose Bewegung der Grenzschichten gegeneinander verantwortlich sind.

Auf diesem Gebiet ist unter verschiedenen Aspekten viel gearbeitet worden. Ohne auf diese Arbeiten hier im einzelnen einzugehen, soll doch auf einige vom WIRTSCHAFTSVERBAND ASBEST (1975) angegebene Zahlen hingewiesen werden. Danach sind in der Bundesrepublik etwa 50 000 Personen exponiert; auf 100 exponierte Personen kommen gegenwärtig eine Asbestose und auf 1000 Personen ein Asbestkrebs.

Nach SELIKOFF und Mitarbeitern (1972) von der Mount Sinai School of Medicine in New York ist die Situation für asbestexponierte Personen wesentlich bedrohlicher. Er beobachtete 17 800 Arbeiter, die beruflich mit Asbest zu tun hatten, in den Jahren 1967 bis 1971. Von ihnen erlagen 459 einem Karzinom, während Asbestose zum Tode von 78 Arbeitern führte. Es starben also sechsmal mehr an Karzinomen als an Asbestose. Unter den Karzinomen waren 26 Mesotheliome, die unter der nicht exponierten Bevölkerung nur sehr selten vorkommen.

Wegen ungenügender Schutzmaßnahmen dürften diese Zahlen allerdings mit denen der deutschen Berufsgenossenschaften nicht vergleichbar sein, sie zeigen aber doch, daß die Gefahr, die von der Aufnahme von Asbestfasern über die Atemwege ausgeht, nicht unterschätzt werden darf.

2. Die Aufnahme über den Magen-Darm-Trakt (oral).

Hier handelt es sich hauptsächlich um die Aufnahme von Asbestpartikeln in Getränken, auf [illegible] im folgenden [illegible] ausführlich eingegangen werden soll. Geringe Mengen von Asbest sind im Talkum enthalten, das zum Polieren von Reis und Schälerbsen verwendet wird sowie Bestandteil von Gleitmitteln für Förderbänder und Dichtungen, z. B. von Kühlschränken, ist. Es handelt sich hierbei aber um so kleine Mengen, daß eine Gefährdung ausgeschlossen werden kann.

3. Die Aufnahme durch Arzneimittel, die unter Umgehung des Magen-Darm-Kanals in den Körper gelangen (parenteral).

Ohne auf die Diskussionen über eine – bisher unbewiesene – Gefährdung durch eine parenterale Aufnahme von Asbestfasern eingehen zu wollen, soll hier nur darauf verwiesen werden, daß die FDA (1975) die Verwendung von asbesthaltigen Filterschichten zur Herstellung von Parenteralien eingeschränkt hat. Über dieses Gebiet informiert ausführlich eine Arbeit von WILKE (1976).

Aufnahme von Asbest mit Getränken

Eine nähere Betrachtung der Aufnahme von Asbestpartikeln mit Getränken zeigt, daß Asbest in Getränken auftreten kann, zu deren Bereitung Trinkwasser verwendet wird. In solchen Getränken, etwa Kaffee und Tee, wird der Asbestgehalt hauptsächlich durch den des verwendeten Trinkwassers bestimmt. Das gilt unter Berücksichtigung der weiter unten angegebenen Arbeit von MAURER und COORS (1975) auch für Bier.

Bei Getränken aus Früchten ist zu unterscheiden zwischen direkt aus der Frucht ohne bzw. mit nur geringem Wasserzusatz hergestellten Getränken (Wein und gepreßte Fruchtsäfte) und solchen, die aus Konzentraten durch Rückverdünnen mit Wasser hergestellt werden (überwiegende Herstellungsweise für Fruchtsäfte). Für letztere gilt Entsprechendes wie für Kaffee, Tee und Bier.

In der Bundesrepublik gibt es hinsichtlich Asbest kaum Trinkwasseruntersuchungen. WILKE (1975) berichtete über eine Trinkwasseruntersuchung im Kreise Bad Kreuznach; es wurden 2×10^{-6} g/l Chrysotil im Trinkwasser gefunden, wobei die Nachweisgrenze ebenfalls bei diesem Wert lag.

Bei Getränken, die – nach entsprechender Vorklärung – mit asbesthaltigen Filterschichten in Berührung kommen können (z. B. Wein, Bier, blanke Fruchtsäfte), erhebt sich die Frage, inwieweit Fasern von Chrysotilasbest aus dem Filtermedium in das filtrierte Getränk gelangen können. Hier ist zu bemerken, daß die meisten der in der Bundesrepublik hergestellten Filterschichten an der Auslaufseite eine faserbindende Außenschicht besitzen, die den Übergang von Chrysotilfasern in das Filtrat verhindert oder zumindest weitestgehend erschwert.

Versuche mit asbesthaltigen Filterschichten

Eigene Untersuchungen sollten zeigen, ob eine Asbestabgabe aus Filterschichten mit den in der Bundesrepublik üblichen Faserschutzimprägnierungen erfolgt und ob durch die Verwendung von Membranfiltern ein zusätzlicher Faserschutz zu erreichen ist.

Dazu wurde Wein unter normalen Arbeitsbedingungen entkeimend filtriert; handelsübliche Filtergeräte wurden mit 5,7 m² Entkeimungsschichten belegt, mit Dampf sterilisiert, mit 60 l Wasser/m² [illegible]

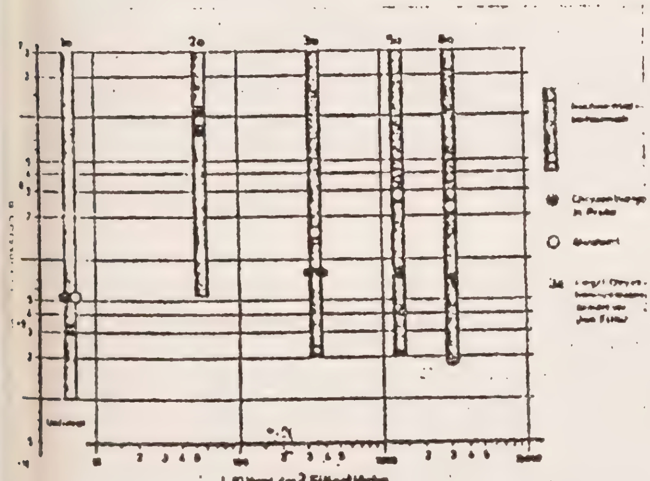
on 50 l · m⁻³ · h⁻¹ insgesamt bis zu 8 Stunden, entsprechend 30 l/m², belastet.

er Versuchsreihe a wird in Abhängigkeit von der Filtrationsdauer ohne Einschaltung eines Membranfilters als Faser-...z ermittelt, ob eine Faserabgabe erfolgt. Dazu wurden in ...abständen je zwei Proben von 1 Liter in sorgfältig vorge...inigten Flaschen aufgefangen und nach der Autoklavierung ...aß der elektronenmikroskopischen Methode von RICKARDS ...) untersucht. Jede Doppelbestimmung wurde durch einen ...lindwert abgesichert.

...ie in der Tabelle 1 aufgeführten Analysendaten sind zur ...eren Übersicht in der Abbildung 1 graphisch dargestellt.

...b.: Chrysotilgehalt vor und während der Filtration von Wein durch Entkeimungsschichten aus Zellstoff-Asbest-Mischungen

...rsuch ...	Filtrationsbedingungen Probenahme	Probemenge l	Chrysotilmenge $\times 10^{-9}$ g/l a	b	Chrysotil in Blindprobe $\times 10^{-9}$ g/l	Nachweisbarkeitsgrenze $\times 10^{-9}$ g/l
1	Unfiltrat am Filtereingang Versuchsbeginn	1,00	5	3	3	1
2	Filtrat nach Vorspülung mit 60 l · m⁻² Filtrationsanlauf	1,00	110	85	Probe zerstört	5
3	Filtrat nach Durchsatz von 350 l · m⁻² bei Dosierung von 4 mg/l Chrysotil	1,00	8	8	16	2
...	Filtrat nach Durchsatz von 1225 l · m⁻²	1,00	8	4	32	2
...	Filtrat nach Durchsatz von 2800 l · m⁻²	1,00	2	7	28	2



...b. 1: Chrysotilgehalt vor und hinter Zellstoff-Asbest-Filtern während der Filtration von Wein

...e Ergebnisse zeigen, daß die Chrysotilpartikel unabhängig ...m Flüssigkeitsdurchlauf bzw. der Filtrationszeit auf einem ...veau zwischen 2 und 8 · 10^{-9} g/l liegen*). Sie unterscheiden ...h damit nicht von den im Unfiltrat gefundenen Mengen. Der ...rsuch 3a zeigt jedoch, daß auch sehr große Verunreinigun...n der zu filtrierenden Flüssigkeiten mit Chrysotilmikrofasern ...rch Zellstoff-Asbest-Filterschichten vollkommen zurückge...alten werden. Dazu wurden dem Unfiltrat laufend 4 mg/l ...brillierte und auf Längen < 5 µm gekürzte Chrysotilfasern ...dosiert.

...urch die Versuchsreihe b sollte ermittelt werden, ob ein evtl. vorhandener erhöhter Asbestgehalt durch eine Nachfiltration mit Faserfängern, das sind nicht faserabgebende Filter, reduziert werden könnte. Verwendet wurden dazu membranbeschichtete Filterkartons mit Porenweiten der Membranauflage von 0,65 und 5,0 µm. Die Tabelle 2 zeigt das Versuchsergebnis.

Tab. 2: Chrysotilgehalt vor und nach der Filtration von Wein mit Zellstoff-Asbest-Schichten und nachgeschalteten Membranfiltern

Versuch Nr.	Filtrationsbedingungen Probenahme	Probemenge l	Chrysotilmenge $\times 10^{-9}$ g/l a	b	Chrysotil in Blindprobe $\times 10^{-9}$ g/l	Nachweisbarkeitsgrenze $\times 10^{-9}$ g/l
1 b	Unfiltrat am Filtereingang Versuchsbeginn	0,92	8	7	1	1
2 b	Filtrat nach Vorwaschung mit 50 l · m⁻² (ohne Membrannachfilter)	1,00	1	2	7	2
3 b	Filtrat nach Durchsatz von 350 l · m⁻² Nachfiltration Membranfilter 0,65 µm	0,95	15	15	2	4
4 b	Filtrat nach Durchsatz von 700 l · m⁻² Nachfiltration Membranfilter 0,65 µm	1,00	2	5	10	2
5 b	Filtrat nach Durchsatz von 1050 l · m⁻² Nachfiltration Membranfilter 5,0 µm	1,00	13	16	10	2

In diesem Fall lag bei guter Übereinstimmung der Einzelwerte der Chrysotilgehalt im Filtrat ohne Einschaltung eines Membranfilters deutlich niedriger als in der unfiltrierten Flüssigkeit. Nachgeschaltete Membranfilter bewirken keine signifikante Herabsetzung des Chrysotilgehaltes. Diese Aussage beschränkt sich auf das vorliegende Beispiel, bei dem die absoluten Chrysotilgehalte der Schichtenfiltrate bereits extrem niedrig lagen.

Zu ähnlichen Ergebnissen, wie vorstehend beschrieben, kamen MAURER und COORS (1975) bei der Filtration von Bier. Sie fanden, daß Bier, welches bei der Endfiltration durch asbesthaltige Filterschichten gegeben wurde, ähnliche Konzentrationen an Asbestfasern aufwies wie Bier, welches durch asbestfreie Filter geschickt wurde. Die asbesthaltigen Filter bestanden zu 97 % aus Cellulose und zu 3 % aus Chrysotil.

Bei der Filtration durch ein nachgeschaltetes Membranfilter mit 5 µm Porendurchmesser war es zwar möglich, die Asbestfasern vollständig aus dem Filtrat zu entfernen. Es erwies sich aber als nicht möglich, die Asbestfasern während des Abfüllens und Eindosens von dem Getränk fernzuhalten.

Einige Ergebnisse dieser Verfasser zeigt die Tabelle 3.

Tab. 3: Faser-Konzentrationen in filtriertem und abgefülltem Bier und die Wirkung eines nachgeschalteten Membranfilters (nach MAURER und COORS, 1975)

Probe	Fasern/l Mittelwert	Bereich	Anzahl der Proben
Bier, filtriert	162	90 – 388	8
Bier, in Dosen	196	81 – 455	10
Bier, in Flaschen	980	530 – 1520	4
Bier, filtriert	199		3
Bier, filtriert, Membranfilter nachgeschaltet	0		3
Bier, Nachfiltration Membranfilter, nach der Abfüllung	213		5

Instabilität von Asbestfibrillen

Für das Schicksal von Chrysotilfasern im Magen ist von besonderer Bedeutung, daß dort, in Abhängigkeit vom Füllungs-

*) Die Probe 2a muß als ungesichert gelten, da ein Blindwert nicht vorliegt.

grad, mit pH-Werten zwischen 1 und 2 gerechnet werden kann.

In einer früheren Arbeit haben Bielig und Döring (1975) bereits darauf hingewiesen, daß Asbestfasern im sauren Medium einer Auslaugung unterliegen. Dieser Säureabbau kann bis zur völligen Herauslösung des Magnesiums führen. Die dabei eintretenden Veränderungen der physikalischen und chemischen Eigenschaften bewirken eine Faserpseudomorphose. Die Morphologie der Faser bleibt dabei erhalten, die Faser wird aber so geschädigt, daß ein Festigkeitsverlust bis zu 100 % eintreten kann.

In diesem Zusammenhang sind erste, noch unveröffentlichte Ergebnisse von Fromme (1975) von Interesse. Er untersuchte das Verhalten von weitgehend in Einzelfasern aufgespaltenen Chrysotilfasern in Wasser, Wein, Pepsi-Cola und Sprite in einem Zeitraum von 3 bis 90 Tagen mit raster-elektronenmikroskopischen und röntgenmikroanalytischen Methoden. Es zeigte sich ein deutlicher Auslaugungseffekt in Abhängigkeit von der Zeit und dem pH-Wert des Untersuchungsmediums.

Die Abnahme des Magnesiumgehaltes war bei Pepsi-Cola und Sprite am deutlichsten. Bei diesen beiden Getränken war nach einem Zeitraum von 95 Tagen unter den vorgegebenen Analysenbedingungen kein Magnesium mehr in den Asbestfasern nachweisbar. Demgegenüber war der Auslaugungseffekt in Wasser gering, während er in Wein stärker auftrat.

Aus den gemessenen Werten läßt sich ableiten, daß in Pepsi-Cola nach ca. 45 Tagen und in Sprite nach ca. 65 Tagen kein Magnesium in den Asbestfasern nachweisbar sein wird.

Eine weitere Versuchsreihe mit den vorgenannten Getränken zeigte außerdem, daß der Auslaugungseffekt bei bedeutend dickeren Faserbündeln den geschilderten Versuchsergebnissen im Prinzip entsprach, jedoch war die Abnahme des Magnesiumsgehaltes geringer.

Nach den angeführten Untersuchungen und nach weiteren, von Bielig und Döring (1975) mitgeteilten Arbeiten erscheint es sicher, daß Asbestfasern im sauren Medium des Magens instabil sind. Eine Schädigung des menschlichen Organismus, wie sie bei pulmonaler Aufnahme von Asbestfasern eintreten kann, erscheint daher unwahrscheinlich und ist bisher auch nicht bewiesen worden.

Tierversuche

Auch Tierversuche verliefen negativ; so wurde an SPF-Wistar-Ratten Asbest verfüttert, und zwar erhielt eine Gruppe 16 Wochen lang wöchentlich 5 bis 10 mg, eine andere Gruppe einmal 40 mg. Es wurde keine krebserzeugende Wirkung gefunden (Newpol, 1973). Lebenslängliche Gaben einer 1 %igen Chrysotil-Diät zeigten bei Hamstern keinerlei Magen- oder Darmtumoren (Smith und Mitarbeiter, 1965). Mageninjektionen von $10^{10} - 10^{11}$ Chrysotilfasern (0,5 bis 2 µm) bei Ratten ergaben Asbestbefunde im Blut und verschiedenen Organen. Bei den Kontrolltieren fanden sich ebenfalls hohe Asbestgehalte in Geweben, nicht aber im Blut (Cunningham und Pontefract, 1973).

Die Ergebnisse von Tierversuchen sind nur begrenzt auf den Menschen übertragbar, und zwar weil die Versuchstiere grundsätzlich anders reagieren können als menschliches Gewebe und weil außerdem in vielen Tierversuchen unter extremen Bedingungen gearbeitet wird, die den Gegebenheiten der Praxis nicht entsprechen.

Um die Resorption von Asbestfasern im Gastrointestinaltrakt unabhängig von Tierversuchen unter in vitro-Bedingungen erforschen zu können, laufen z. Z. Versuche mit einem Resorptions- und Lösemodell. Sie werden das Schicksal von Asbestfasern, die mit Getränken aufgenommen werden, klären helfen.

Zusammenfassung:

Bei der Beurteilung der physiologischen Wirkung von Asbestfasern auf den menschlichen Organismus muß streng nach der Art der Aufnahme — pulmonal, oral oder parenteral — unterschieden werden. Die pulmonale Aufnahme kann bei exponierten Personen zu Lungenschädigungen — Asbestose oder Karzinom — führen. Wegen des ubiquitären Vorkommens findet sich Chrysotil im Nanogrammbereich auch in Getränken, es existieren aber keine bündigen Beweise für eine gesundheitsschädigende Wirkung von Asbestfasern bei oraler Aufnahme.

Summary:

Discussing the physiologic effect of asbestos fibers in human organism one must strictly differ between the kind of uptake: pulmonary, oral or parenteral. People exposed to pulmonary uptake might suffer lung diseases like asbestosis or cancer. Due to its ubiquity, Chrysotil is also present in beverages at an nanogram level. There is no sufficient evidence, however, that asbestos fibers in case of an oral uptake are harmful to health.

Résumé:

Lorsqu'on discute l'influence physiologique des fibres d'asbeste sur l'organisme humain il faut discerner très strictement les différentes façons d'absorption de ces fibres: il peut s'agir d'une absorption pulmonaire ou orale ou d'une absorption du tissu.

L'absorption pulmonaire peut être la cause d'affections du poumon — asbestose ou cancer — chez les personnes exposées. Puisque la serpentine fibreuse est présente en tout lieu on en trouve des nanogrammes même dans les boissons; cependant il n'y a pas de preuve définitive d'une influence nuisible pour la santé causée par des fibres d'asbeste absorbées par la bouche.

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Anschrift der Verfasser

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THE ASBESTOS FIBRE PICK-UP IN BEVERAGES

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INTRODUCTION:

Over the past few years many reports have been published in newspapers and magazines as well as in technical publications, warning of the dangers to human health resulting from the intake of asbestos fibres.

As a result of these reports a certain amount of uncertainty has been created, especially in undertakings engaged in the bottling of beverages. The question arose as to what degree of asbestos fibre contamination in beverages was acceptable and whether the use of asbestos filter sheets for the filtration of beverages as used over the past decades would be a further source of contamination.

Asbestos is defined as finely fibred crystallized silicates of various types (ULLMANN, 1953 & BERGER 1961). For the manufacture of filter sheets the chrysotile asbestos is exclusively used. This type is a member of the serpentine-asbestos family and has the following simplified formula $Mg_6 \left[(OH)_8 Si_4 O_{10} \right]$

Various possibilities for the intake of asbestos fibres

To solve these problems it must first be ascertained in which manner the intake of asbestos fibres into the human body occurs.

1) The intake via the breathing apparatus (pulmonary)

This hazard mainly applies to people working with asbestos where asbestosis and asbestosis together with lung cancer have been recognized as occupational hazards by the labour unions (since 1936). In cases of lung cancer developing as a result of asbestosis it is usually what is known as a Mesotheliom, that is a tumor of the Mesotheliom. The Mesotheliom is the tissue layer between the lung and the chest wall and is responsible for the frictionless movement of the various adjoining tissues.

In this area a lot of research has been done with a view to various aspects. Without going into details of this work, the following figures have been disclosed by the Asbestos Research Union (1975). In West Germany there are approximately 50 000 persons exposed to asbestos. At present out of 100 exposed persons one case of asbestoses occurs and out of 1 000 persons one case of lung cancer.

According /..

According to Selikoff and Associates (1972) at the Mount Sinai School of Medicine in New York, the position of persons exposed to asbestos is much more dangerous. During the period from 1967 to 1971 he observed 17 800 workers, who during their normal working day were in contact with asbestos. Of these, 459 died of cancer whereas asbestosis claimed the lives of 78 workers. This shows that six times as many died of cancer than of asbestosis. Of those who died of cancer, 26 were Mesotheliom cases, which is a very rare occurance in non-exposed persons.

As a result of insufficient protective measures these figures cannot be compared to those given by the German Research Union, however, they do show that the danger of breathing in asbestos fibres must not be underestimated.

2) The intake via the stomach and intestines (oral).

This deals mainly with the intake of asbestos particles in beverages, which will still be discussed in greater detail. Small amouts of asbestos are found in Talcum which is used for the polishing of rice and split peas. Also certain lubricants for conveyors and gaskets for refrigerators contain asbestos particles. These however occur in such minute quantities that they can be totally discounted as a health hazard.

3) The intake via medicines which do not enter the body via the stomach and intestines (Parenteral).

Without going into long discussions about an improved health hazard due to parenteral intake of asbestos fibres, we would only like to mention that the FDA (1975) has prohibited the use of asbestos filter sheets in the production of parenterals. This subject has been covered in more detail by WILKE (1976).

THE INTAKE OF ASBESTOS BY MEANS OF BEVERAGES

A closer examination of the intake of asbestos particles in beverages shows, that asbestos can occur in beverages, where drinking water is used in their preparation. In beverages such as coffee and tea the asbestos content is governed by the amount of drinking water used. This also applies, to a certain degree, to beer as discussed below by MAURER AND COORS (1975).

In Fruitdrinks we must differentiate between drinks made directly from fruit, without or very little water added (such as wine and pressed fruit juices) and those produced from concentrates which are then diluted with water. For the latter the same conditions as for coffee, tea and beer will apply.

In West Germany there are virtually no drinking water analyses as far as asbestos is concerned. In a drinking water test carried out by WILKE (1975) in the vicinity of Bad Kreuznach it was found to contain 2×10^{-8} g/l of chrysotile asbestos.

The question arises as to what extent contamination from fibres of chrysotile asbestos through filtration with filter sheets can take place in a liquid (such as wine, beer and clear fruit juices) which has already been pre-filtered. Here it should be noted that most filter sheets manufactured nowadays are "fibre proofed" on the exit side of the sheet, which either completely prohibits or at least makes it almost impossible for chrysotile fibres to get into the filtrate.

Tests done with asbestos filter sheets

Own tests should show whether this "fibre proofing" of filter sheets sufficiently inhibits contamination or whether the use of a membrane filter will give added protection against fibres.

The following describes a test done on wine using sterile filter sheets under normal working conditions. A standard filter equipped with sterilising sheets having a total area of 5,7m^2 was used.

The filter was sterilized with steam, rinsed with water at the rate of 60L/m^2 and then filtration commenced at a rate of 350L/m^2/hr for a total of 8 hours or a total of 2800L/m^2.

The test series "a" indicates whether the length of filtration time, without the use of a membrane filter as a fibre protection, results in the giving off of fibres. 1 litre samples were taken and collected in thoroughly cleaned flasks at regular intervals. These samples were then autoclaved and examined electronmicroscopically by the method of RICHARDS (1973). Each set of results was checked by a random sample.

TABLE 1: Chrysotile content of wine before and during filtration through sterile cellulose-asbestos filter sheets:

Test No. /..........

Test	At what stage sample taken	quantity of sample	chrysotile content x 10^{-9}g/l a	b	chrysotile in random sample x 10^{-9}g/l	Limit of proof x 10^{-9} g/l
1a	unfiltered at start of filtration	1	5	3	3	1
2a	after pre-rinse with water 60L/m^2	1	110	85	sample destroyed	5
3a	filtrate after 350l/m^2 with dosage of 4mg/l of chrysotile	1	8	8	16	2
5a	filtrate after 1225l/m^2	1	8	4	32	2
6a	filtrate after 2800l/m^2	1	2	7	26	2

In the above case the chrysotile content of the filtrate prior to the filtration through a membrane filter was considerably lower than the unfiltered liquid. The filtration through a membrane filter did not appreciably lower the chrysotile content. This statement is restricted to the above example where the absolute chrysotile content of the filtrate after sheet filtration was already exceedingly low.

Similar results were obtained by HAURER AND COORS (197[illegible]) in the filtration of beer. They found that beer which had been filtered by asbest sheets showed similar concentrations of asbestos fibres as beer which had been filtered through asbestos free sheets. The asbestos sheets were composed of 97% cellulose and 3% chrysotile asbestos.

By using a membrane filter with a pore size of 5 m for the final filtration it was possible to separate all the asbestos fibres from the filtrate, but it was not possible to keep the asbestos fibres out of the beverage during the filling process.

Table 3 shows some of these results

Table 3/...

Table 3: Fibre concentration in filtered and filled beer and the results of using a membrane filter for final filtration.

Sample	average fibres/litre	Range	No. of samples
Beer filtered	162	90- 266	6
Beer in tins	198	81- 435	18
Beer in bottles	980	530-1520	4
Beer filtered	199		3
Beer, filtered final filtration membrane	0		3
Beer final filtration membrane, after filling	218		5

Instability of Asbestos Fibrills

The greatest factor governing the destiny of chrysotile fibres in the stomach is that here pH values of between 1 and 2 can be expected.

An earlier study by BIELIG AND DORING (1975) has shown that asbestos fibres in an acid environment are subject to deterioration. This deterioration can result in a total dissolution of the magnesium. The resultant changes in the physical and chemical properties create a fibre-pseudo-morphosis. Whereas the physical structure of the fibre remains unchanged, it can however be damaged in such a way that 100% loss in strength or rigidity can occur.

Of interest in connection with the above, are some still unpublished results by FROMME (1975). He examined the reaction of single chrysotile fibres in water, wine, pepsi-cola and sprite during a period of from 3 to 90 days, by means of electromicroscopic and X-ray microscopic methods. These examinations showed a definite deterioration depending on the time of exposure and the pH value of the surrounding medium.

The decrease in the magnesium content was most noticeable with Pepsi-cola and Sprite. After a period of 35 days the above mentioned analyses showed that there was no more magnesium to be found in the asbestos. Contrary to this the deteriorating affect on the fibre of water was less whereas that of wine was greater.

On hand of the results obtained, one can assume that after approximately 45 days in Pepsi Cola and 65 days in Sprite no more magnesium could be traced in the asbestos fibres.

A further test with the same beverages as above, but using thicker asbestos fibres, showed that in principle the same type of deterioration occurred, only that the decrease of the magnesium content in the fibres was less.

The above tests show without doubt that asbestos fibres in the acid environment of the stomach are completely unstable. A health hazard to the human body, as is the case in pulmonary intake of asbestos fibres, is thus highly unlikely and has also to date not been proved.

Tests on animals

Tests on animals have also only achieved negative results. A group of SPF = Wistar Rats were fed with asbestos, i.e. one group received 5 - 10 mg weekly over a period of 16 weeks whereas another group received a single dose of 40 mg. In neither case was any sign of cancer found (NEWPOL 1973) Hamsters that were fed a life-long diet containing 1% chrysotile fibres showed no sign of stomach or intestinal tumors (SMITH AND ASSOCIATES 1965).

The results obtained from tests on animals can only be applied to the human body to a very limited degree. This is due to the fact that the animals generally react differently to human tissue and that animal tests are often carried out in extremes which do not apply to normal conditions.

Tests are at present being carried out, independent of animal tests, to determine the affect of asbestos fibres on the gastro-intestinal tract. These results will help to determine the fate of asbestos fibres which are taken in, in the consumption of beverages.

SUMMARY

Discussing the physiologic effect of asbestos fibres in the human organism one must strictly differ between the kind of intake, pulmonary, oral or parenteral. People exposed to pulmonary intake might suffer lung diseases such as asbestosis or cancer. Due to its ubiquity, chrysotile is also present in beverages at an nanogram level. There is not sufficient evidence, however, that asbestos fibres in case of an oral intake are harmful to health.

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BRIEF

TO THE

ROYAL COMMISSION ON ASBESTOS

PRESENTED BY:

THE LONDON CUPE COUNCIL

MARCH 27, 1981

The London CUPE Council welcomes this opportunity to relate some of the concerns that we have concerning Asbestos in the London Area.

We would like to address ourselves to a number of areas.

1. The Asbestos programs within the schools
2. Asbestos problems in the municipal area
3. Programs relating to public buildings
4. Disposal of Asbestos

Before addressing ourselves to these concerns however, we would like to endorse all the recommendations contained in the brief presented by the Ontario Federation of Labour, to this Royal Commission.

We do not intend to go into the question of the health effects of Asbestos. We believe that the question of whether Asbestos is harmful to health, has been adequately answered over the last few years. We would just like to reinforce the view of organized labour that because Asbestos is a recognized carcinogen, there should therefore be a zero exposure level. We are of the view that the prevention of cancer must start with the prevention of exposure to carcinogens.

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Asbestos Programs in School Boards

There are a number of school boards contained in the London area. These include the London school board, the Middlesex County School Board, the Elgin School Board, and the Separate School Board. All of these school boards have undertaken a program of asbestos recognition and action in containing the asbestos. We however, have some very serious concerns about the effectiveness of the programs in the London area. It appears that the school boards have attempted to do as little as possible whilst ensuring that they can claim to be following the directive from the Ministry of Education concerning Asbestos. Our observations of the Boards are as follows:

London School Board

The London school board which is the largest school board in this area, has apparently undertaken a survey of its schools. We say apparently, because the London School Board has not seen fit to inform its Health and Safety Committee of its program, nor has it bothered to reply to a request by our National Office asking for information on this program. This information was requested by our National Office on all school boards in Ontario, this followed a suggestion from the Minister of Education, Dr. Bette Stevenson, that school boards had the

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information and would be willing to inpart this information to our union if we were to write directly to them. (You will find a copy of the letter included at the back of this brief). In total 193 school boards were approached for the information that Dr. Stevenson said should be forthcoming. Of the 193 school boards approached, just 78 replied to our request. The London School Board was one of those that has refused to reply.

Enquiries amongst the staff who work for the London School Board have shown that of the total of 83 schools in this area, only two have been identified as having asbestos. These are Byron Southwood Public School and Lorne Avenue Public School. At this time, it is our understanding that the Lorne Avenue School has had no work done on it to relieve the problem.

We have an extreme concern that the London School Board have conducted a very rushed and superficial examination of their schools. It is our contention that based on other school area and based on studies in the United States, a greater percentage of the Schools examined would have shown asbestos. This leads us to suspect that the school board did not contract nor enforce a proper program of recognition. This lack of concern we must note is not uncommon, our information from the replies that our National Office received from school boards across the country, indicates that most school boards are treating the asbestos program in a similar fashion.

Had the London School Board seen fit to involve the union and his Health and Safety Committees in the program, a more detailed and comprehensive examination of all the schools could have taken place. It is inconceivable that the school board would conduct examinations of schools and not use the expertise and the knowledge available in recognizing areas that may contain asbestos that is the janitorial staff in the individual schools.

Another problem area in all of the London schools that has not been addressed by the London School Board, is the 160 plus furnaces that are in use in the schools. It is our information that each furnace has to be re-insulated at least once a year. There is a program of re-insulation that is carried out during the summer break period and that an employee is engaged in this exercise on an almost full time basis. The furnace doors are sealed with an asbestos powder. The employee carrying out the work is of course exposed extensively to asbestos dust. He has never been informed of the hazards of using asbestos nor has the school board explained the health effects that may incur. He does however wear a mask but this is at his own insistance. Enquiries have shown that the other school boards do not employ persons to carry out this type of work, they do however contract the job out.

The main contractor in this area is Waterloo Manufacturers. The most common type of boiler involved in this work is the Cleaver Brooks boiler. Observations by school board employees of the contractors, have shown that the employee of the contractor do not wear masks, nor do they take any particular precautions. They certainly do not enforce the type of protective programs recommended by NIOSH. The NIOSH Program is described in its slide presentation called "An Asbestos Program and Protection".

If this type of work is being conducted right across the province, it is apparent that many workers are risking extreme exposure to asbestos dust.

London and Middlesex County Separate School Board

The London and Middlesex County Roman Catholic Separate School Board has 35 schools under its jurisdiction. This school board also failed to reply to the enquiry from our National Office. At this time, the information that has been given to the local union (LU 1166), is that none of the schools contain asbestos. The Health and Safety Committee representing the workers in the school board, have asked that a Safety Representative from the Committe, be allowed to go around and help sample for asbestos. This request has been refused on the grounds that it has already been done. We are not aware of anyone doing sampling, nor have we been informed of the method by which the identifying program was carried out. It is difficult to believe, but out of 35 schools, not one contains asbestos.

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The Health and Safety Committe were in attendance at a meeting recently, where an inspector from the Ministry of Labour was present. This inspector, Mr. McKenzie, when asked about asbestos, told them there was more hazard from asbestos because of dust from brakes on the street than there was in the schools. We wonder how Mr. McKenzie would know that this was true unless he conducted air sampling in both areas. It appears to us that this was a patronizing attempt to placate the committee members. We would suggest that this attitude by the Ministry Inspector is not uncommon. We are led to believe that experiences of other committees confirm this opinion.

<u>The Middlesex County School Board</u>

The Middlesex County Board of Education is responsible for 5 secondary and 29 elementary schools. Their response to the enquiries from our National Office dated 25th of July 1980, reported that they had hired a consultant to inspect all of the schools. The results at that time had not been received, nor have we been informed of the results since then.

It should be noted that the Health and Safety Committees were not involved in the sampling of the schools in the Middlesex County area.

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The Elgin County Board of Education

The Elgin County Board of Education is responsible for 32 elementary and 5 secondary schools. In their reply to the enquiry from our National Office, they informed us that the schools represented by the Board had been surveyed for asbestos, and reported that three schools needed corrective action. The schools were Wess, Forest Park Public School and SECI. The Health and Safety Committee again was not involved in the identification program. We do not know what corrective action was taken.

Inadequate Program

We have a real concern that the program undertaken by the school boards in the London area, are completely inadequate. We have a number of reasons for insisting that this is the case. Firstly, you will have heard already from Local 27 of CUPE, the Union which represents the School Board workers in Windsor Ontario. As you have been made aware, the school board was reluctant to admit to the existence of asbestos, and even more reluctant to develop a program that would ensure all of the areas that contained asbestos were identified. We have a concern that the school boards in our area also take the same attitude. We base our assumptions upon the fact that in not one instance has the local union or its representatives

on the joint health and safety committees been consulted or involved in developing a program that will identify the extent of the problem. Quite the opposite, the committees have not even discussed the programs.

We have a number of observations to make in this area. The refusal of the school boards to discuss the problems, are contrary to the Occupational Health and Safety Act of Ontario. Section 8 part 6 sub-paragraph A. It is the function of a committe and it has the power to (a identify situations that may be a source or hazard to workers). This is not being done, in spite of the assertion of the Deputy Minister of Labour T. Armstrong, committees are not being involved in this area. Again, we must point out that not only are the boards in violation of the Occupational Health and Safety Act, but they are negligent in not utilizing an extremely important source of information, that is the workers who spend much of their time in the schools, to identify possible hazard areas.

Another reason that we are concerned about the effectiveness of the recognition programs by the school boards, is the experience of the United States in this area. In a report, asbestos contamination in the United States schools from use of asbestos surfacing materials. Dr. William J. Nicholson reports the following of 2,400 schools surveyed in New Jersey,

a total of 265 were identified as having an asbestos problem. A total of 11%. In New York City, 1,100 schools were surveyed and 351 were observed to have asbestos problems. A total of 32%. In Massachussets, 1,200 schools were surveyed and 138 were identified as having asbestos problems. A total of 11.5%. The asbestos identified was the type that was sprayed on surfaces, and hence is the type most likely to become friable.

If we take the most conservative figures from this report, that is the New Jersey survey which showed 11% of schools with the problem, we can forecast with some degree of confidence, that the London School Board for instance, with its 83 schools, would expect to find 9 or 10 schools with asbestos present. Instead, the report finds just 2 have the problem.

The report also estimates that as many as 2 to 6 million students in the United States may be exposed to asbestos fibres. Also 100 to 300 thousand teachers may also be exposed. If we do the normal estimation for Canada, that is divide the number by 10, this reflects the tenfold population figures of the United States, we can assume that two to six hundred thousand students and as many as ten to thirty thousand teachers. We further estimate that the figures would be similar for support staff who work in schools.

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If it is possible it would be adventageous to this Commission if they ascertained exactly what was happening in the school boards across the province. We would suggest that the Commission ask all of the school boards the following questions:

1. How many schools are they responsible for
2. Have everyone of the schools been surveyed
3. How and by what method were they surveyed
4. Was any sampling conducted
5. What were the results of the sampling
6. Was the Health and Safety Committee and the employees involved in any other identification program
7. What steps have been taken to rectify any problem areas

We believe that if the Commission is to compare the replies of the large majority of school boards, with the programs conducted by such school boards as Toronto, Etobicoke and Espanolla, you will find that there is a great lack of adequate programs in place.

Public Utility Workers

There are a number of other areas that we would like to bring to your attention. Workers employed by the London Public Utility Commission have a number of potential exposures to asbestos and we would like to list these at this time.

Many electrical cables that are run underground are covered with an asbestos insulation. Exposure occurs to workers especially where they have to make joins in the cable. 2. Where switching gear is present, there is normally flash barriers erected between the switching mechanism. These flash barriers are normally made of asbestos. 3. In the area of street lighting, the gasket between the lenses very often is made of asbestos, and exposure may occur there. 4. Many of the heating systems that the Public Utility Commission is responsible for have asbestos insulation in the boilers and also in pipe lagging. 5. City water pipes and sewer pipes extensively contain asbestos. In many cases the cutting of these pipes is done in the sewers or the underground tunnels where the pipes are to be laid. This cutting is normally done with a diamong saw. Exposure to asbestos from this cutting can be extensive. 6. In making sewer connections, that is joining one length of pipe to another, asbestos cement, is a common binder.

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In all these cases, exposure can be exaggerated because of the confined space in which the work is being conducted. The Joint Health and Safety Committe have had short discussions about asbestos, but there has been no suggestions by the London Public Utility Commission of a program of recognition nor of removal. The only measure that has been discussed is the suggestion that workers may have to have medicals in the future. This of course reflects the fact that when asbestos becomes a designating substance under the Occupational Health and Safety Act, part of that regulation will be regular medical examinations of all workers exposed.

We find that it is inconceivable that the London Public Utility Commission, knowing the extent of the asbestos exposure, has not implemented a program of removal and of substitution.

<u>City Workers</u>

Many workers who are employed by the City of London, are exposed to asbestos. Asbestos has been identified as being present in City Hall. A Dr. Sullivan conducted a number of air sampling tests, these showed the presence of asbestos in City Hall.

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He concluded however that no health hazard existed. It should be pointed out that Dr. Sullivan is reputed to be the expert for this area in asbestos sampling and recognition. Although Dr. Sullivan may have some competence in measuring amounts of asbestos, we question his competence in assessing health problems. As far as we are aware, he has no expertise in the medical area, and this is reflected by the fact that wherever he conducts tests, and where he finds the presence of asbestos, he always concludes his report with the statement that no health hazards exist. This is contrary to the overwhelming evidence that there is no safe level of exposure to asbestos, that any level of exposure may lead to cancer. It is unfortunate that Dr. Sullivan is getting a reputation for being an asbestos expert.

Another area of concern is in the disposal of asbestos. It is noted that garbage collectors in London are not warned of the hazards of asbestos. In fact, they would have great trouble in identifying asbestos. And yet, asbestos can be put into the garbage of households without any controls, it can be dumped at landfill sites without any controls, there are no attempts being made to prevent exposure of garbage collectors or landfill sites operators. We suggest that this is one area that the Commission should be investigating.

that one way to control the accelerating spread of asbestos into the environment is to ensure that the cities across the province have a decent control program. We would suggest that each city needs to look at its by-laws regarding the disposal and the collection of asbestos. We echo the recommendations of CUPE's Ontario Educational Institute's Coordinating Committe, that asbestos be disposed of by placing it in worked out mines.

We would also like to comment on the fact that the many other public buildings in Ontario, that is public libraries hospitals, town halls, government buildings, post offices etc. have not had the same consideration that the schools in Ontario have been given. There is no program of recognition and prevention in hospitals for example where babies are being born. In many cases, the first breath that the infant takes is literally filled with asbestos fibres. The child of course will go on to breathe fibres throughout the rest of his life unless we come to grips with the overall problem of asbestos. We would recommend that all public buildings be examined for the presence of asbestos and that this asbestos be removed and disposed of.

In conclusion, we would like to make the following observation. The cancers that we see in this present day and age, one in five die of this disease, are the results of exposure 20 years or more in the past. The harvest of carcinogens that we are exposed to now will be reaped in the forms of cancers in twenty to thirty years from now.

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We have it within our grasp to ensure that our children are protected from at least one of the major cancer causing agents of the present day society, that the use of asbestos be banned for all non essential products, and that future use be phased out as safe substitutes become available. We thank the Commission for its attention.

Recommendations

1. That the non essential use of asbestos be banned in Ontario
2. That as safe substitutes become available, all uses of asbestos be phased out.
3. That all employers immediately implement a program of identification and of control regarding asbestos in all of their worksites. That this program be a co-operative venture of the joint Health and Safety Committees.
4. That this Royal Commission subpoena the reports and the results of all tests taken in the school across Ontario.
5. That this Royal Commission investigate and make recommendations regarding collection and disposal of asbestos waste. That a recommended set of by-laws be established in each community in Ontario to ensure that exposure is minimised.
6. That disposal of asbestos be by dumping waste in unused mine sites.
7. That all contractors who use asbestos either in removal or repair work, be licenced by the Ontario Ministry of Labour and also be required to conduct their work according to the recommendations set forth by NIOSH.
8. That the Toronto School Board Reports recommendations regarding removal be accepted as standard procedure by all school boards in Ontario.

Canadian Union of Public Employees - Syndicat Canadien de la Fonction Publique

Suite 800, 233, rue Gilmour Street, Ottawa, Canada K2P OP5 — Tel.: 613-237-1590

July 18, 1980

TO THE CHAIRPERSON
ALL SCHOOL BOARDS
PROVINCE OF ONTARIO
****

Dear Sir/Madam:

Please find enclosed a copy of a letter from the Minister of Education to myself.

As you will see from the letter, the Minister has referred me to you for the following information:

1. How many of the schools in your jurisdiction have been surveyed for asbestos?

2. How many have been identified as having asbestos present? (Names of schools and location of asbestos in those schools.)

3. What are the results of any tests or analysis that you have conducted?

4. What preventative measures are you taking?

Your assistance and cooperation in this matter will be appreciated. As you may know, a Royal Commission into asbestos is being conducted in this Province, and such information will be important when trying to assess the overall problem.

I am surprised that the Ministry of Labour and of Education is not correlating the action taken in this area.

Thank you in advance for your anticipated cooperation.

Yours faithfully,

C Lambert

COLIN LAMBERT
Special Assignments Officer

CL*syh
Enclosure

cc: G. Hartman — L. Nicholson
K. Cummings — B. Stephenson
J. Bird — R. Elgie

Ontario

APR 2 3 1980

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Ministry of
Education

Ministry of
Colleges and
Universities

Mowat Block
Queen's Park
Toronto, Ontar
M7A 1L2
416/965-5277

April 9, 1980

Mr. C. Lambert
Special Assignments
Officer
Canadian Union of Public
Employees
233 rue Gilmour Street
Suite 800
Ottawa, Ontario
K2P 0P5

Dear Mr. Lambert:

I have received your letter of March 18, 1980.

In mid-1979, the Ministries of Education/ Colleges and Universities requested a survey of all school, college and university buildings to determine the presence of materials containing asbestos. The results to date, for those boards which have reported, are as follows:

- no asbestos material - 88%
- in a form requiring further analysis - 6%
- in a non-hazardous form - 6%

As a follow-up to this, a manual entitled "Inspecting Buildings for Asbestos", prepared by the Ministry of Labour, was distributed to all school boards, colleges and universities on January 25, 1980. A copy of the manual is enclosed. It was requested that all educational authorities collect samples of friable materials and send them to the Occupational Health Laboratory of the Ontario Ministry of Labour for testing. If the analyzed materials contain asbestos fibres, each case will be studied to determine the most appropriate procedure to overcome the problem.

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The laboratory analysis program is proceeding. However, as the results of the lab tests are sent directly to the school boards, the information regarding the school buildings where asbestos material is present can be obtained from the boards. The Directory of School Boards of Ontario is enclosed for your convenience.

Thank you for writing to me.

Yours truly,

Bette Stephenson

Bette Stephenson, M.D.
Minister

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ASBESTOS CONTAMINATION IN UNITED STATES SCHOOLS FROM USE OF ASBESTOS SURFACING MATERIALS*

William J. Nicholson, Edward J. Swoszowski, Jr., Arthur N. Rohl, James D. Todaro, and Antoinette Adams

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Until recently there was only limited awareness of the extent of asbestos use in public school buildings. Reports existed of damaged asbestos surfaces in a grade school in Wyoming,[1] a university dormitory in California,[2] and in the Yale School of Arts and Architecture in New Haven, Connecticut.[3] In each case, public concern led to the removal of the asbestos material. In both the Wyoming school and the Yale Library, air measurements by optical microscopy showed asbestos concentrations that in some circumstances exceeded 5 f/ml, the time-weighted-average occupational standard in effect at the time. In the fall of 1976, flaking of sprayed-on asbestos was reported in a school in Howell Township, New Jersey, leading to its removal and to further concern about the presence of deteriorating asbestos in other school buildings in New Jersey. As a consequence, the New Jersey Department of Education requested that the school administrators report the presence and condition of asbestos surfaces in all school buildings within the state. Responses revealed that 265 (of approximately 2400) schools in all 142 districts in the State had nearly three million square feet of what they considered to be asbestos material in classrooms, auditoriums, hallways and other rooms accessible to pupils.

ASBESTOS SURFACING MATERIALS IN NEW JERSEY SCHOOLS

In cooperation with the Department of Education of New Jersey, the Environmental Sciences Laboratory of Mount Sinai School of Medicine undertook an investigation of the asbestos use in New Jersey schools.[4] All of the schools with asbestos surfacing material in twenty-one districts were selected for study. The selection was accomplished using random numbers, but also employed a weighting factor to include more of those school districts which had reported greater use of asbestos. In all, forty-eight schools were visited and samples were taken of the material thought to be asbestos. These were analyzed for their asbestos content and for the presence of other mineral materials. Areas such as classrooms, hallways, auditoriums, cafeterias and locker rooms were priority locations for sampling, since they are used by large numbers of students as well as by faculty. In general the suspect materials were on ceilings, although they might also have been applied to walls. Of 64 samples collected, 50 were in such areas, the remainder being from custodial or boiler rooms.

During visual inspection of these schools and the analysis of collected samples, three general types of asbestos containing material were found. One was a friable

*This research was supported by Contract N01-ES-7-2113 of the National Institute of Environmental Health Sciences.

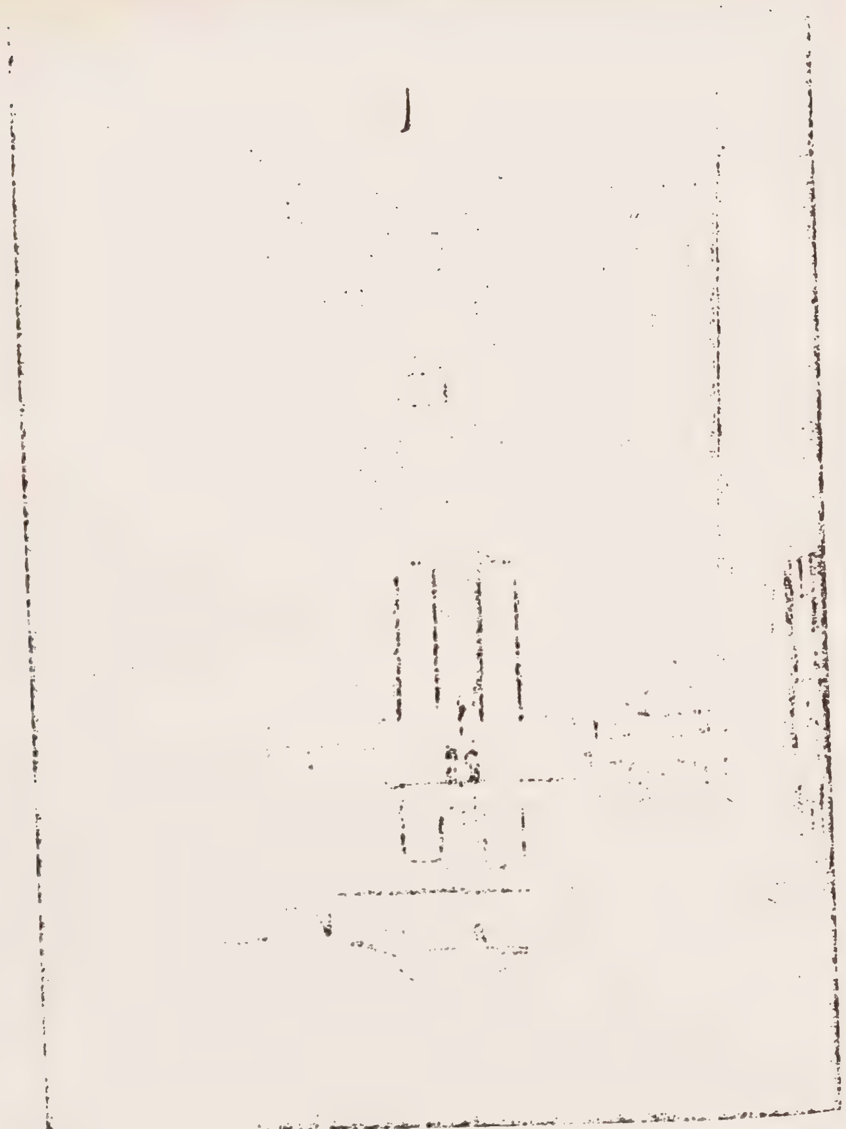

FIGURE 1. Damage to asbestos materials sprayed on a hallway ceiling. This was easily reached by students and extensive damage was present throughout the length of the hallway.

loosely bonded, fibrous mat approximately one-half inch thick. The mat had been applied by blowing a mixture of asbestos, mineral (rock) wool, clay binders (as bentonite), adhesives, synthetic resins and other proprietary agents through a two-to [illegible] diameter hose. Upon leaving the hose, the material passed through a water spray which activated the adhesives and binders. The applied material would then

have been tamped and often sprayed with emulsion type sealers latex or acrylic paints. Most material of this type observed in this survey was readily damageable and could also break loose from the underlying surface because of the inadequacy of the binders. In the schools visited, the most troublesome problems were those seen with this type of material and its application. FIGURES 1 and 2 illustrate extreme examples of damaged and deteriorating sprayed-on asbestos ceilings. Approximately one-third of the schools visited had this type of material applied. Its use in boiler rooms and custodial areas was more frequent, however.

A second type of coating material was a dense, compactible mixture of asbestos and other products, such as vermiculite. This would have been applied in the wet state to walls and ceilings, compacted and formed into a relatively smooth matrix. This material would also usually be over-painted, either shortly following application or subsequently. In the schools we visited, spontaneous disintegration of such materials was not seen. However, in areas accessible to students, various degrees of abuse were observed. Severe damage of such material is shown in FIGURES 3 and 4.

Thirdly, asbestos was found incorporated in cementitious or plaster-like matrices. These were applied as slurries to walls and ceilings, forming a textured surface of considerable hardness which would usually be over-painted. Such plasters or textured paints have considerable stability and are unlikely to allow the release of asbestos fibers through erosion. Although damage to these surfaces can occur from physical abuse or abrasion, this was infrequently seen.

In each school visited the asbestos material was categorized as above and an estimate made of damage or deterioration. The results are outlined in TABLE 1.

FIGURE 2. Disintegration of fibrous spray material in a building storage area. The conditions seen occurred spontaneously, with no evidence of external abuse.

FIGURE 3. Damage to cementitious asbestos spray in a school hallway. Some of the indentations occurred from flagpoles inadvertently striking the ceiling during color guard practice.

Overall, two thirds of schools with asbestos surfaces had some visible evidence of damage to the material.

The x-ray analysis of materials, by and large, confirmed the presence of asbestos in those schools that had reported its use. Such was the case in 97% of the schools that believed their sprayed-on material contained asbestos. In only two schools was the reported presence of asbestos not confirmed by x-ray diffraction analysis of the sampled material. On the other hand, this survey did not provide information on the number of schools that may have been mistaken in their belief that they had no asbestos in surfacing material, and, as a result, did not report its presence. That this possibility exists is exemplified by one instance in which a school official stated that his administration had been told by its architect that the sprayed-on plaster material in their school was asbestos free. An analysis of the material, however, revealed that it contained about 2% chrysotile. Further, many schools did not report the presence of asbestos in school areas not used by pupils, such as boiler rooms where extensive use of asbestos occurs. While not accessible to students, the possibility exists that such asbestos could be dislodged and transported into student use areas.

Similar data from other areas indicate the use in New Jersey is fairly typical. New York City has reported asbestos surfaces to be present in 351 of approximately 1100 schools in the city. Massachusetts found asbestos in student areas of 138 of 1200 schools surveyed. Widespread use of asbestos has also been reported in schools in Indiana, Kentucky and other states.[2] If the estimates from those states surveyed are applicable to the entire nation, two to six million pupils may be attending schools with asbestos surfaces in pupil areas. An additional 100,000 to 300,000 teachers would also be expected.

ASBESTOS CONCENTRATIONS IN SCHOOLS AND IN THE AMBIENT AIR

Air samples have been taken in ten schools in which asbestos materials were used as surface coatings in halls, cafeterias, libraries and other pupil-use areas. Three of the schools were located in surburban areas of New Jersey and Massachusetts, and seven

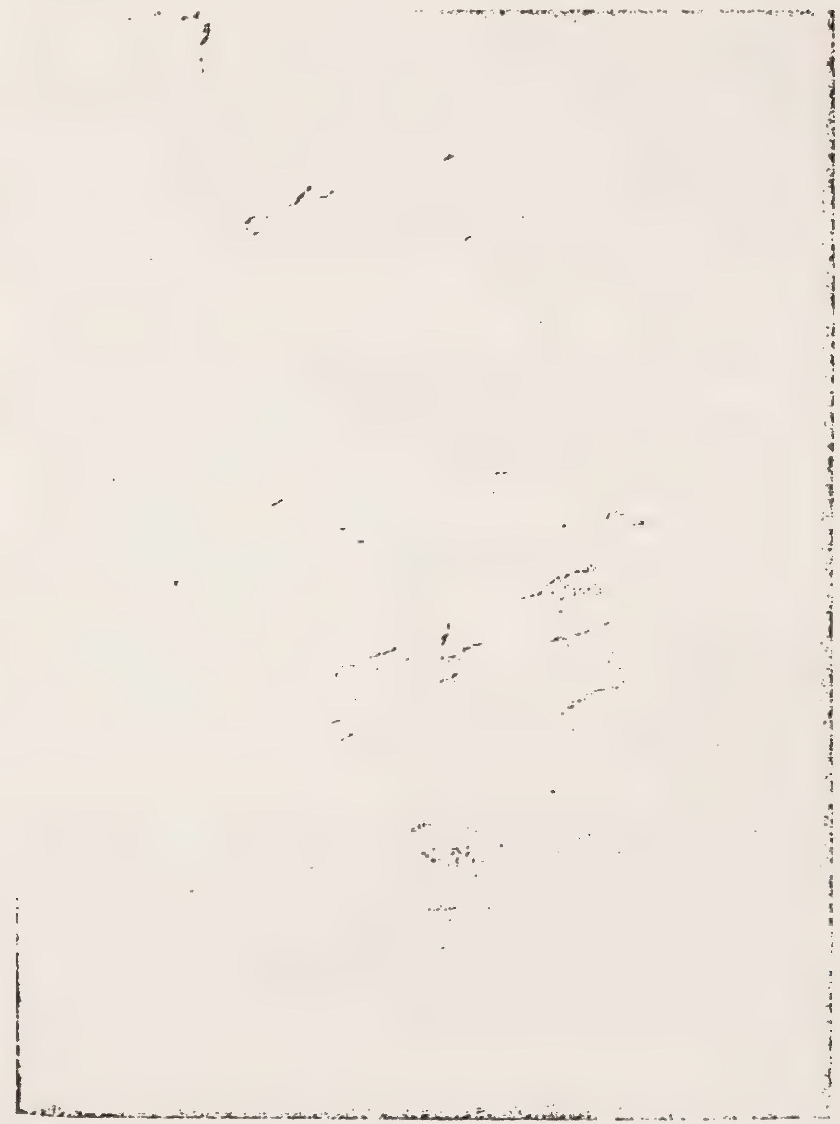

FIGURE 4. Further damage to cementitious ceiling material. Here evidence exists that some students wished to be remembered beyond their stay at the school.

TABLE 1

CONDITION OF ASBESTOS SURFACES IN 64 NEW JERSEY SCHOOLS

Type of Asbestos Material	Intact Undamaged	Minimum Damage, No Deterioration	Localized Damage or Deterioration	Severe Damage or Deterioration	Totals
Loose, friable fibrous asbestos spray material	4 (18%)	10 (45%)	5 (23%)	3 (14%)	22
Moderately dense asbestos spray material, often in association with vermiculite or perlite	15 (42%)	13 (36%)	4 (11%)	4 (11%)	36
Plaster or textured paint material with asbestos binder	4 (67%)	1 (17%)	1 (17%)	0 (0%)	6
Totals	23 (36%)	24 (38%)	10 (16%)	7 (11%)	64

in urban centers of New York and New Jersey. The schools were selected for air sampling because of visible damage in some of the asbestos surfaces. The samples were collected on 0.8 μm pore size membrane filters and analyzed using electron microscopic techniques that determined the amount of chrysotile asbestos in each specimen. This variety of asbestos was quantitated because it could easily be identified on the basis of its unique tubular structure. Amphibole asbestos (either amosite or crocidolite) could also be present in the air of schools or in the ambient air, but is much less commonly found. For example, only seven of 64 bulk material samples in schools contained either of these minerals. However, if present in the air sampled, such asbestos would add to those concentrations measured.

To prepare a sample for analysis, a portion of the sample, mounted on a microscope slide, was ashed in a low temperature-activated oxygen furnace for approximately four hours. This served to remove the membrane filter material, all organic material in the collected sample, soot and other carbonaceous material. The residue, consisting mostly of fly ash and mineral matter, was dispersed on microscope slides in a solution of 1% nitrocellulose in amyl acetate. Upon evaporation of the amyl acetate, the dispersal was scanned for uniformity and representative areas were chosen for transfer to electron microscope grids for scanning. The samples thus prepared were scanned at magnification of 20,000X. Typically, four to eight 100 μm squares of separate grids from each sample were scanned, and the mass of chrysotile fibers was determined by sizing each individual fiber. Control blank filters were processed with each set of four samples and background levels of chrysotile determined from them subtracted from that found on sample filters.

TABLE 2 lists the distribution of chrysotile concentrations found in samples taken over four to eight hours in these ten schools. Chrysotile asbestos concentrations ranged from 9 nanograms/cubic meter of sampled air (ng/m^3) to 1950 ng/m^3 with an average of 217 ng/m^3. Outside air samples at three of the schools varied from 3 ng/m^3 to 30 ng/m^3 with an average of 14 ng/m^3. In all samples but two (which measured 320 ng/m^3 and 260 ng/m^3) no asbestos was visible on the floor of the area sampled although surface damage was generally present near the area sampled. The highest value (1950 ng/m^3) was in a sample following routine sweeping of a hallway in a school with water damage to the asbestos surface. However, no asbestos was visible on the floor prior to sweeping.

TABLE 2

DISTRIBUTION OF CHRYSOTILE ASBESTOS CONCENTRATIONS IN 4- TO 8-HOUR SAMPLES TAKEN IN PUBLIC SCHOOLS WITH DAMAGED ASBESTOS SURFACES

	Electron Microscopic Analysis	
Asbestos Concentration (ng/m^3) Less than	Number of Samples	Percentage of Samples
20	1	3.7
50	6	22.2
100	12	44.4
[illegible]	19	70.4
500	25	92.6
1000	26	96.3
2000	27	100.0

TABLE 3

DISTRIBUTION OF 24-HOUR CHRYSOTILE ASBESTOS CONCENTRATIONS IN THE AMBIENT AIR OF UNITED STATES CITIES[8]

	Electron Microscopic Analysis	
Asbestos Concentration (ng/m^3) Less than	Number of Samples	Percentage of Samples
1.0	61	32.6
2.0	119	63.6
5.0	164	87.7
10.0	176	94.2
20.0	184	98.5
50.0	185	99.0
100.0	187	100.0

These concentrations in schools with damaged asbestos surfaces can be compared with those found in other circumstances. Asbestos of the chrysotile variety has been found to be a ubiquitous contaminant of ambient air. A study of 187 quarterly composite samples collected in 48 United States cities during 1969 to 1970 showed chrysotile asbestos to be present in virtually all metropolitan areas.[8] TABLE 3 lists the distribution of values obtained in that study. Each value is from a composite of five to seven 24-hour samples and thus averages over possible peak concentrations which could occur periodically or randomly. It is noteworthy that 98.5% of these ambient air samples had concentrations less than 20 ng/m^3, a value *exceeded* by 96% of the school samples.

In a study of the ambient air of New York City, in which samples were taken only during daytime working hours, higher values than those mentioned above were obtained.[9] These were six- to eight-hour samples collected between 8:00 A.M. and 5:00 P.M., and reflect what could be intermittently higher concentrations during those hours compared to night time periods, for example. TABLE 4 records the chrysotile

content of 22 samples collected in the five boroughs of New York. It should be noted that the samples analyzed in all of the studies discussed above were taken during a period when fireproofing highrise buildings by spraying asbestos-containing material was permitted. The practice was especially common in New York City. While no sampling station was known to be located adjacent to an active construction site, unusually high levels could nevertheless have resulted from the procedure. The highest concentration measured in these samples, 65 ng/m^3, was exceeded by 70% of the school samples and the average of all 26 school samples (217 ng/m^3) was more than 10 times the average of the New York City samples (17 ng/m^3).

Of particular relevance to the current study are the analyses for chrysotile of 116 samples of indoor and outdoor air collected in or near 19 buildings in five United States cities.[10] The buildings sampled included those in which various asbestos minerals had been applied as fireproofing material to the steelwork or for acoustic or decorative purposes. Average values for the air inside buildings ranged from 2.5 ng/m^3 to 200 ng/m^3, with individual measurements ranging from 0 to 800 ng/m^3.

For outside air the variation for the average concentration at a given site extended from 0 to 48 ng/m^3. Little contamination was found in buildings utilizing cementitious

TABLE 4

CHRYSOTILE CONTENT OF AMBIENT AIR IN NEW YORK CITY BY BOROUGH (6 TO 8-HOUR DAYTIME SAMPLES)[7]

Sampling Location	Number of Samples	Asbestos Concentration (ng/m^3) Range	Average
Manhattan	7	8-65	30
Brooklyn	3	6-39	19
Bronx	4	2-25	12
Queens	4	3-18	9
Staten Island	4	5-14	8

material but 47% of buildings with friable asbestos materials, either on room surfaces or in return air plenums, had air concentrations in excess of 20 ng/m^3 versus 14% of all outside control samples. Twenty-four samples were taken in buildings with asbestos applied to wall and ceiling surfaces for decorative or acoustic purposes. Of these, three showed concentrations exceeding 100 ng/m^3 in areas where the asbestos was damaged. However, in the absence of damage, air concentrations similar to background were observed.

The majority of the data on asbestos concentrations in schools were obtained in circumstances in which damage had occurred to friable, noncementitious asbestos-containing sprayed material with consequent dislodgement of asbestos fibers. In general, when significant levels were found, physical deterioration of the surface of the material was evident. While fewer data exist regarding air concentrations associated with damage to cementitious asbestos-containing sprayed material, the finding of higher than usual concentrations in one school with such material raises the same question here as well. Thus, the conclusions that can be drawn from these data include the following:

1. If visible damage to or erosion of any asbestos-containing sprayed material is evident, increased asbestos air concentrations would have existed at the time of damage and may still persist.
2. As such damage is likely to recur or to continue, asbestos air concentrations in excess of background (50 ng/m^3) may be expected in the future.
3. Where visible damage or erosion is not evident, asbestos air concentrations are likely to be little different from background, but the possibility of later damage and future asbestos fiber release with concomitant increased air concentrations cannot be excluded.

ENVIRONMENTAL ASBESTOS HEALTH EFFECTS

Serious asbestos disease associated with direct[11-13] or indirect[14] occupational exposure to asbestos has been extensively documented. Of increasing importance, are the findings of asbestos disease in other than occupational circumstances. In 1960 Wagner reviewed 47 cases of mesothelioma found in the Northwest Cape Province, South Africa in the previous five years.[15] Of this number, roughly half were in people who had worked with asbestos. Virtually all of the rest were in individuals who had, decades before, simply lived or worked in an area of asbestos mining (one lived along a roadway in which asbestos fibers were shipped). This germinal observation demonstrated that asbestos exposure of limited intensity, often intermittent, could cause mesothelioma. The hazard was further pointed by the findings of Newhouse,[16] who showed that mesothelioma could occur among people whose potential asbestos exposure consisted of their having resided near an asbestos factory or in the households of asbestos workers. Twenty of 76 cases from the files of the London Hospital were the result of such exposure, 31 were occupational in origin and asbestos exposure was not identified for 25.

A recent extensive study of the effects of household exposure has been conducted by Dr. Henry Anderson and his colleagues of the Mount Sinai School of Medicine.[17] In a clinical survey of 679 family contacts of former asbestos factory workers, it was found that the x-rays of 35% of these individuals showed abnormalities characteristic of asbestos exposure. It did not matter greatly what the relationship to the worker was; the asbestos dust in the household could effect any resident—wife, sons, daughters, parents. While almost all were currently asymptomatic, and while most would perhaps suffer no impairment from their past exposure, others may be stricken with an asbestos-related cancer as a result of past household asbestos exposure. (During this continuing survey, five deaths of mesothelioma have already been identified in this group of family contacts.)

Unfortunately, no exposure data exist on the concentrations of asbestos dust to which these various populations were exposed 20, 30, or 40 years ago. Thus, direct dose-response data on asbestos health effects in environmental circumstances do not exist. However, recent measurements of asbestos concentrations in the homes of workers, around sites where asbestos materials were sprayed as fireproofing or in the neighborhood surrounding uncontrolled asbestos-processing facilities, usually yield values in the hundreds of ng/m^3, with concentrations only rarely exceeding 1000 ng/m^3.[18] This suggests that the long-term exposure of many children to concentrations above 100 ng/m^3 may not be without later risk of asbestos disease.

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PROPER COMPENSATION FOR THE DAMAGED WORKER

Joe A. Adam

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I have been asked to participate on the panel "Future Problems to be Anticipated" with the specific assignment of alternatives and replacements. It is flattering that Dr. Selikoff would think I am qualified to speak for organized labor on suitable alternatives and replacements. I do not qualify, however, as an expert on materials for the insulation or building products industry. The panel title does open a broader area that requires public discussion.

It is apparent that no matter what materials are used to replace asbestos, it is very possible that the problems we are discussing at this conference could be repeated for replacement materials, such as fiber glass, mineral wool, or other materials that have similar physical and chemical compositions. The problem is not how to deal with asbestos as an isolated hazard to the worker but, more importantly, how asbestos should be handled in relation to all of the other serious health hazards that exist in the workplace.

In reviewing the topics for discussion at this conference, it is obvious that The New York Academy of Sciences focuses on the health effects, pathology, morbidity, mortality, regulation, surveillance, monitoring, and control of the health hazard. To be sure, a scientific body has the responsibility to be concerned in all of these areas. To a concerned layman outside the scientific community, it appears that much research effort, debate, and methodology are repeated for each health hazard. Conferences have been held, are currently under way, and are proposed for the future on such topics as asbestos, cotton dust, coal dust, coke ovens, grain dust, pesticides, and carcinogens. Each of these conferences, seminars, or workshops will deal with cause and effect relationships. At this conference, most of the discussion has been directed toward what causes asbestos disease and how it affects the worker. Natural questions follow that this conference must address: How do we control asbestos in the workplace; how do we protect the worker who is exposed to asbestos; and, most important, how is the diseased worker made whole?

It is my impression, based on conversations with Drs. Selikoff, Polakoff, and Felton and researchers from the Department of Health, Education, and Welfare, National Institute for Occupational Safety and Health, and National Cancer Institute, that we generally know what causes asbestos-related disease, how it affects the body, and how to keep the material from entering the body and affecting the worker. The larger issue facing this conference and American society as a whole is: How do we take care of the diseased worker and his family? How do we make him whole? If we cannot make the worker whole, how can we compensate him for damaging his health and body? Who has the responsibility for making him whole?

The membership rolls of this Academy list some of the best academic, technical, scientific, and medical minds in the country. Your President in 1977, Dr. Herbert J. Kayden, wrote in the program for this conference:

60

BENDIX AUTOMOTIVE OF CANADA, LTD.

PRESENTATION TO THE ROYAL COMMISSION

ON

MATTERS ARISING FROM THE USE OF ASBESTOS

IN FRICTION MATERIALS

March 27, 1981

BENDIX AUTOMOTIVE OF CANADA, LTD.

PRESENTATION TO THE ROYAL COMMISSION ON MATTERS
ARISING FROM THE USE OF ASBESTOS IN
FRICTION MATERIAL PRODUCTS

March 27, 1981

TABLE OF CONTENTS

PART I

INTRODUCTION

Bendix Automotive of Canada, Limited (BAC) is pleased to avail itself of the opportunity to address the Commission on matters relevant to its terms of reference with particular emphasis on the current use of asbestos in the brake manufacturing industry, the present governmental standard for maximum exposure to asbestos fibers permitted in the workplace, the historic and current role played by BAC in the areas of environmental control and employee medical examination and recordkeeping for the protection of its employees, and the policy of this Corporation and that of its parent, The Bendix Corporation, for the early abolition of asbestos in all of its manufacturing processes.

BAC recognizes and acknowledges without reservation the terms of reference assigned to the Commission by the Government. The Chairman of the Commission in his opening address on October 31, 1980 quite rightly observed that one of the main objectives of the Commission was to investigate all matters relating to health and safety arising from the use of asbestos in Ontario, but to stop short of investigating individual allegations of wrongdoing. However, in its Brief to the Commission, the International Union, United Automobile, Aerospace and Agriculatural Implement Workers of America (U.A.W.)

has elected to use the Commission as a forum for the expression of its inaccurate and misleading views of the BAC manufacturing operations at Windsor, Ontario. The Company does not intend to burden the Commission with a reply to these allegations in depth, but cannot overlook the fact that the Commission will consider all written submissions to be public documents. While the Company deeply regrets that the U.A.W. has chosen to use the Commission so inappropriately, we cannot permit the public record to conclude without a meaningful response. Part II of this submission has been prepared in concise terms for the purpose of addressing the most serious errors and misstatements in the UAW Brief and is capable of elaboration in every area, with the sole purpose of correcting, as a matter of public record, these and other errors contained in that brief.

DRUM BRAKE ASSEMBLY MANUFACTURING PROCESS

In order that the Commission may fully understand the drum brake assembly manufacturing process, we have provided the following operations review.

The manufacture of automotive drum brake assemblies requires numerous parts, most of which are steel or iron. The only part containing asbestos is the brake shoe lining itself. The asbestos content of Bendix asbestos-containing brake lining varies from 20% to 70% chrysotile asbestos fiber depending upon the intended use (normal range of 30% to 50% asbestos).

The manufacture of friction material linings which has always been conducted by Bendix in the United States, involves the mixing of asbestos, inert fillers, binders, resins, etc. in various proportions depending upon the final use of the brake assembly on a specific vehicle. Once these materials are mixed, they are formed, cured, rough ground, etc., before being shipped for use at a drum brake assembly manufacturing operation such as the BAC facilities in Windsor, Ontario. Exhibit I indicates the manufacturing processes involved in producing brake linings.

Upon receipt at a Bendix drum brake assembly operation, friction material linings are either drilled and riveted to a

metal support or shoe, or bonded using an adhesive. The shoe and lining assembly is then ground to a finished size and is finally assembled into a completed drum brake.

It is important to understand that asbestos fibers in friction materials are encapsulated in resins and binders which is analagous to the use of steel reinforcing rods in concrete. The distinction between "free" and "bound" asbestos is extremely important because it determines the probability of fiber release, which in turn, directly relates to the probability of a health risk.

THE EXPERIENCE OF BAC WITH, AND THE RESULTS OF GOVERNMENTAL PARTICIPATION IN AIR QUALITY ASSESSMENT BY THE MINISTRIES OF LABOUR & ENVIRONMENT - AN HISTORICAL OVERVIEW

In 1964, the Ministry of Labour issued regulation 196/64 which established in Section 20 (c) a standard for air exhaust controls in industrial establishments utilizing asbestos in any form. Although BAC had installed dust collection equipment in the mid-1950's, modified plans for upgrading of the equipment then in place to the standard required by this regulation were submitted to the Ministry of Labour for approval and then implemented in both BAC plants in Windsor, Ontario.

There is no record of air quality control tests having been taken at BAC prior to 1975. However, on June 17, 1975 the Ministry of Health, utilizing a standard established in 1973, reported fiber levels in the BAC Windsor plants to be one-eighth the allowable standard of two fibers per cubic centimeter of air greater than 5 microns in length. There were no significant changes in the manufacturing operations and dust collection systems between 1965 and 1975.

In August 1976, the Occupational Health Branch of the Ministry of Health inspected and approved a newly installed Ferro Tech Dust collection system incorporating the latest control

technology available. Further air quality control testing was conducted by the Ministry of Labour on five additional occasions between June 27, 1977 and April 14, 1979 and in each case the results indicate asbestos fiber levels in the ambient air within the BAC manufacturing facilities well below the standard.

In January 1980, the Ministry of Labour collected 88 personal and general area air samples. Laboratory analysis by the Ministry of Labour indicates that all results were less than 40% of the 2 fibers per cubic centimeter of air standard and, further, 58 of 88 samples were 0.1 fibers per cc or less. The results are to be found in Exhibits II and III of this Brief.

On August 22, 1979, the Canadian environmental engineering and ecological consulting firm, Envirocon, was retained by BAC to conduct asbestos emission tests outside the BAC plant premises on Argyle Road in Windsor. The results of those tests, found in Exhibit IV of this Brief, indicate that the BAC asbestos emission level was less than 2% of the allowable standard.

It has been our experience that effective dust control technology has been available to industry for many years and that the present standard for air quality in the workplace and in the immediate areas adjacent to and outside plant premises

REVIEW OF STANDARD INDUSTRIAL MEDICAL PROGRAMS AND RECORDS AVAILABLE TO AND MAINTAINED BY BAC

Aside from pre-employment physical examinations, BAC did not generate medical information on its employees; however, it did participate in a medical surveillance program sponsored by the Industrial Chest Disease Service (ICDS) of the Ontario Ministry of Labour.

Chest X-rays and pulmonary function tests were administered by ICDS using a mobile unit. The Service reviewed plant operations and decided which BAC departments had employees who would require chest x-rays and pulmonary function tests. All employees of those departments were offered diagnostic testing by ICDS. Employees were notified of their participation in the program though bulletin board announcements and follow up by supervisory staff. However, on occasion several employees refused to participate in this program.

The ICDS operated on a 18-month cycle between tests; however, they returned to the plant approximately every six months to test new employees or those who may have been missed previously. The only information received by BAC following these tests was a letter stating the number of employees tested and whether any suffered from active tuberculosis, silicosis or asbestosis. No names or specific medical infor-

cannot only be met, but exceeded to a very marked and significant degree.

mation was ever provided to BAC. The Company was advised that specific information from the ICDS was furnished to the employee's personal physician.

The only other "medical" information which the company may have accumulated in its records (on a non-routine basis) included:

- notes from physicians regarding employee absences or the need to place an employee on a light-duty job;

- claims submitted to BAC's insurance carrier for benefits payable during absences resulting from non-work related injuries and illnesses under the terms of the company's sickness and accident benefit program;

- claims submitted to the Workmen's Compensation Board for work-related injuries and illnesses (which generally did not include a medical diagnosis); or

- cause of death information for employees with company sponsored life insurance policies or those eligible for pension benefits.

Our experience with medical testing programs leads us to believe that a mobile unit is the most efficient method for testing large groups of employees in an industrial facility. Presently, the ICDS operates the only "approved" unit of this type in Ontario. We would recommend that in the interest of preventive medicine, additional mobile units be obtained by the Ministry of Labour or, in the alternative, this service be contracted out to private industry.

BAC INDEPENDENT MORTALITY STUDY

On February 14, 1980, The Bendix Corporation announced that it would commission a study by an independent research organization to evaluate any cause and effect relationship between the work environment and health of employees at BAC facilities in Windsor.

In August 1980, BAC engaged the services of S.R.I. International, an internationally recognized authority in the field of epidemiological studies, to conduct such an independent study. They have prepared and submitted a plan, which has been found acceptable to the Ministry of Labour, and have begun collecting the data necessary to perform their study. S.R.I. has stated, however, that BAC employee records are not sufficiently comprehensive to permit the study from this source alone. For example, employee records do not contain relevant information such as: pre-employment personal, medical and family histories; detailed work histories; and cause of death information. As a result, S.R.I. has collected general data on former BAC employees, (name, sex, dates of birth, hire and termination, social insurance number etc.) from company records. They will then work with Statistics Canada and the Ministry of Labour to determine if BAC employees were at any increased risk to asbestos related disease as a result of working at our Windsor facilities. The study results are expected from S.R.I. by November, 1982.

The Ministry of Labour has chosen to conduct its own study and has been given access to the company records it requires for this purpose.

ALTERNATIVES TO ASBESTOS IN FRICTION MATERIALS

Bendix representatives addressed the U.S. Environmental Protection Agency and the Consumer Product Safety Commission Workshop on Substitutes for Asbestos on July 14, 1980. A copy of that presentation is annexed as Exhibit V, and is submitted to the Commission for study in greater detail. A summary of the presentation follows.

Friction materials for automotive brakes are complex composites containing three general types of ingredients: reinforcing fibers; modifers that adjust or maintain friction level, wear rate, and noise properties; and organic resin binders. Historically, the foundation or major constituent of automotive friction materials has been asbestos fiber, so chosen because of thermal stability, friction level, reinforcing properties, availability, and relatively low cost.

Numerous substitutes for asbestos in conventional friction materials, such as brake linings, have been evaluated, including both naturally occurring and synthetic materials. Direct substitution of these alternative materials in conventional formulations has resulted in poor friction levels, friction instability, roughness, structural failure, increased noise, mating surface deterioration and/or front-to-rear vehicle brake imbalance. Complete reformulation, not

simple substitution, is necessary to meet the numerous, complex performance requirements of consumers, manufacturers, and government standards.

In the 1960's, a new class of friction materials, called semi-metallics, was developed by The Bendix Corporation to meet sharply increased governmental and vehicle requirements, primarily in heavy-duty applications. Semi-metallics also operate efficiently in the brake system installed in smaller passenger vehicles. Semi-metallics, while more expensive to produce, rely on steel fiber and powder metallurgy techniques for reinforcement, but do not require asbestos. The overall development took over ten years from introduction to significant customer acceptance.

Another new and separate class of friction materials has been under development by The Bendix Corporation for approximately five years specifically for drum lining applications. Further development effort will be necessary, not only to confirm the performance characteristics of these new substitute fiber formulations, but also to develop new processing techniques. These new friction materials will be more costly, however, due to the ingredients and new processing techniques. It should be emphasized, however, that these newly developed friction materials will be tested and monitored to ensure continuing employee health in their use.

SUMMARY

- Effective dust control technology has been available to industry for many years which permits industry to meet, and in fact exceed to a marked degree, the current asbestos standards for air quality in the workplace and in adjacent areas.

- The Ministry of Labour should increase the number of mobile medical testing units available to industry or, in the alternative, this service be contracted out to private industry.

- BAC has commissioned SRI, International to study the cause and effect relationship in worker exposure to asbestos at its facilities in Windsor. Findings and conclusions are expected in November 1982.

- The Bendix Corporation is committed to finding an alternative to asbestos in friction materials.

PART II

The following information is provided to correct the most significant errors and misstatements in the brief submitted by the UAW to the Commission regarding the BAC operations in Windsor, Ontario.

- It has been suggested publicly that 13 of 19 illnesses resulting in death - the subject of claims to the Workmen's Compensation Board - were caused by asbestos exposure. This statement is incorrect. Nineteen claims were submitted to the Board and seventeen were denied. Two claims were allowed based entirely on the application of the principle of "benefit of the doubt".

- On Page 8 of the UAW Brief, the statement is made that Bendix announced the closure of its Windsor operations on June 20, 1979, 16 days after a communication to all employees from the Director of Employee Relations regarding asbestos exposure inside the Windsor plants. While the inference to be drawn from these statements is obvious, the UAW draft is incorrect. The statement from the Director of Employee Relations quoted on Page 7 and 8 of the UAW Brief was released on July 4, 1979. The plant closings were announced on June 20, 1980 and

were implemented solely because of economic conditions in the automotive industry.

- During the history of the plant operations, BAC reached its largest hourly workforce of 778 in 1976 at which time 88 employees worked in the friction materials operations. During the 1940's and 1950's, fewer than 50 employees were involved. The balance of the workforce - at all times - was engaged in non-asbestos work including the machining of iron castings, stamping of metal parts, manufacturing of power brake units and other products for the automotive industry. Geographically, at all times, friction materials operations occupied a relatively small area in the two plants in Windsor.

- BAC installed dust collection equipment in the mid-1950's and continued to improve upon this system by replacing equipment with systems incorporating the latest technology as they became available. In 1965 modifications were made to the five (5) existing collectors which were subsequently approved by the Ministry of Labour.
  Until 1969, the dust collection units were located inside the plant and cleaned three times per day. The exhaust air was filtered prior to discharge and the filters were cleaned and replaced on a timely basis.

- In 1975 the existing five bag collectors located outside the building were replaced by one central dust collector bag system which was placed in the same location. It is, therefore, entirely inaccurate to suggest that the 1977 methods of dust control presented a situation in the workplace characterized by high exposure to airborne asbestos particles. The Air Quality Assessment report of the Occupational Health Branch, Ministry of Labour, dated June 27, 1977, following tests conducted on June 9, 1977, is annexed hereto as Exhibit VI.

- As discussed in Part I of this Brief, BAC participated in the Industrial Chest Disease Service (ICDS) program under the guidance and direction of the Ministry of Labour. The company did not restrict the number of employees to be tested, but cooperated fully in this program.

EXHIBIT I

MAJOR PRODUCTS FLOW CHART — BRAKE LINING

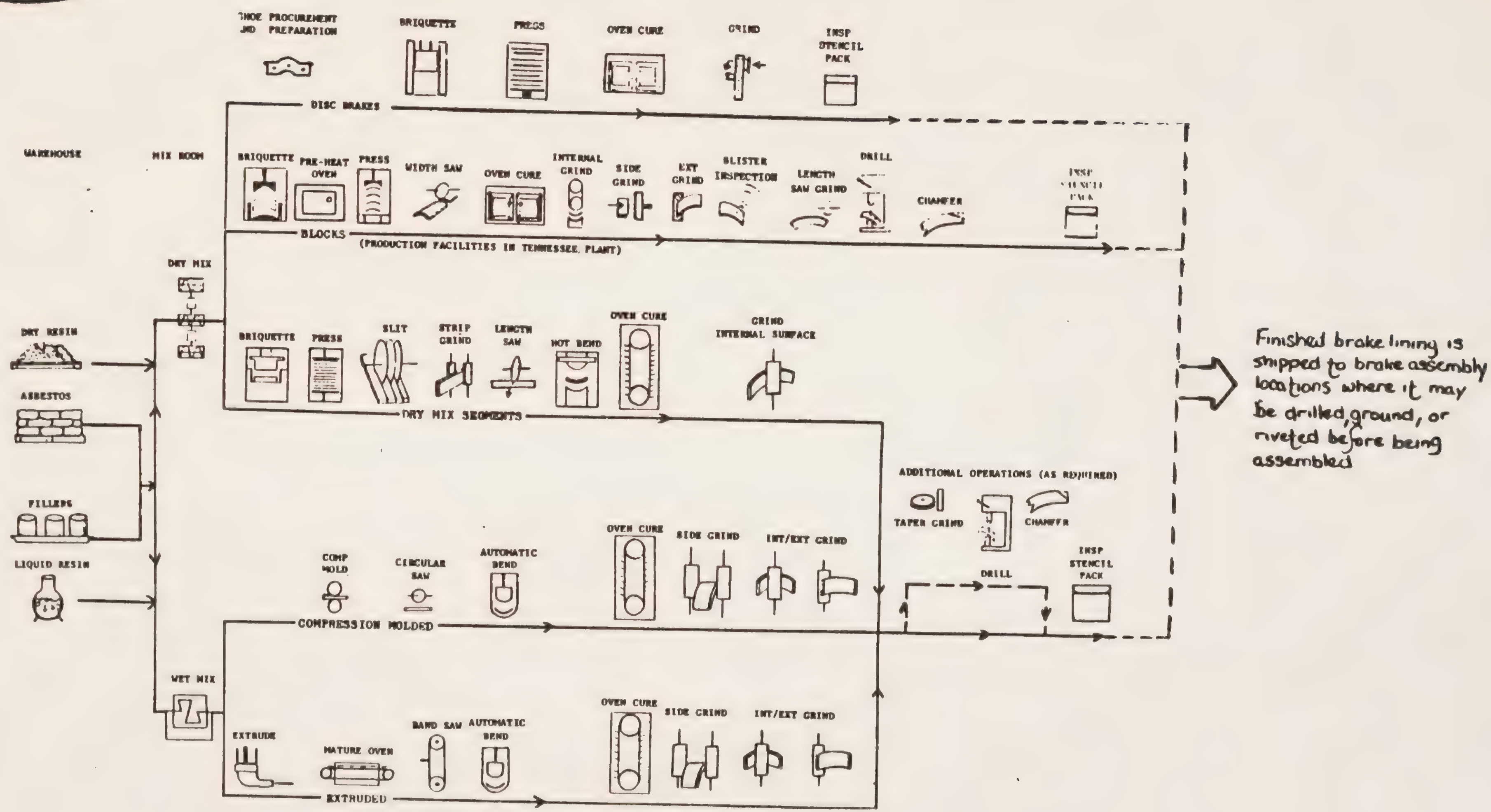

EXHIBIT II

Ontario Ministry of Labour | Occupational Health Branch | Occupational Health Engineering Service

Table of Results

[x] Personal Samples
[x] Area Samples

Company: Bendix Automotive
Address: Prince Rd. , Windsor, Ontario

Date: Jan. 31/80
Table No: 1
OHB File No: 18080 BEOB-M
AOA File No:

Air Samples

Standard =2f/cc

Hazard: ASBESTOS

Sample No.	Employees Name and [x] Job Description or [x] Location	Pump Name and Code No.	Time Minutes	Volume Litres	Total Fibres Greater than 5 Micrometers in Length per cc of Air	TWA	CON'C TLV
50A	D. Weaver-brake assembler, workstation A3	Bendix B179	95	190	0.08	0.14	0.07
50B	"	"	80	160	0.16		
50C	"	"	95	190	0.19		
51A	T. Campbell - brake assembler, workstation A1	Bendix B154	104	208	0.06	0.13	0.07
51B	"	"	114	228	0.20		
51C	"	"	92	184	0.11		
52A	C. Reaume - brake assembler, workstation A6	Bendix B152	313	626	0.03		0.02
53A	F. Bondfiglio - brake assembler, workstation A4	Bendix B176	100	200	0.03	0.08	0.04
53B	"	"	111	222	0.05		
53C	"	"	95	190	0.17		
54A	J. Simon - brake assembler, workstation B2	Bendix B153	298	596	0.04		0.02
55A	M. Wilson - brake assembler, workstation B4 (wore respirator 3M # 8710)	Bendix B156	81	162	0.36	0.26	0.13
55B	"	"	88	176	0.38		
55C	"	"	93	186	0.07		
56A	B. MacDonald - brake assembler, workstation B5	Bendix B57	80	160	0.05	0.10	0.05
56B	"	"	89	178	0.04		
56C	"	"	94	188	0.20		
57A	G. Renaud - brake assembler, workstation B3	Bendix B38	77	154	0.08		
57B	"	"	88	176	sample contaminated		
57C	"	"	87	174	0.02	0.05	0.03

Ontario Ministry of Labour | Occupational Health Branch | Occupational Health Engineering Service

Table of Results

[x] Personal Samples
[x] Area Samples

Company: Bendix Automotive
Address: Prince Rd., Windsor, Ontario

Date: Jan. 31/80
Table No: 1 cont'd
OHB File No: 18080 ~~BEOB-M~~
AOA File No:

Air Samples

Standard = 2 f/cc

Hazard: ASBESTOS

Sample No.	Employees Name and [x] Job Description or [x] Location	Pump Name and Code No.	Time Minutes	Volume Litres	Total Fibres Greater than 5 Micrometers in Length per cc of Air	TWA	CON'C / TLV
58A	R. Hunter - stamping operator, Line A	Bendix B40	294	588	0.06		0.03
59A	T. Marchesin - colour coder, Line A	Bendix B30	293	586	0.06		0.03
60A	J. Renaud - stamping operator, Line B (wore respirator 3M # 8710)	Bendix B94	295	590	0.12		0.06
61A	B. Byrne - shoe loader, Line B	Bendix B130	84	168	0.18		
61B	"	"	117	234	0.15	0.20	0.10
61C	"	"	90	180	0.29		
62A	Locker area, north of brake assembly dept., on lockers at north end	MSA, M73	288	576	0.03		0.02
63A	Line B, north side, on central column	MSA, M72	101	202	0.10		
63B	"	"	99	198	0.11		
63C	"	"	110	220	0.10	0.10	0.05
64A	Welding dept., central	MSA, M 74	263	526	0.05		0.03
65A	Inspection/set up area, west of brake assembly dept, central	MSA, M70	279	558	<0.01		
66A	East side of brake assembly dept., on central column	MSA, M71	304	608	0.03		0.02
67A	West side of brake assembly dept., on central column	MSA, M80	294	588	0.03		0.02
68A	Teledyne line, central	MSA, M23	286	572	<0.01		
69A	Dept. 28, master-vac assembly, Line # 5, south side, central	MSA, M17	275	550	<0.01		

n440 (9/78)

Ontario Ministry of Labour | Occupational Health Branch | Occupational Health Engineering Service

Table of Results

[x] Personal Samples
[x] Area Samples

Company: Bendix Automotive
Address: Prince Rd., Windsor, Ontario
Date: Jan. 31/86
Table No: 1 cont'd
OHB File No: 18080 BEOB-M
AOA File No:

Air Samples

Standard = ^{2}f/cc

Hazard: ASBESTOS

Sample No.	Employees Name and [x] Job Description or [x] Location	Pump Name and Code No.	Time Minutes	Volume Litres	Total Fibres Greater than 5 Micrometers in Length per cc of Air	TWA	OHC TLV
70A	Line C (not operating), north side, on rear of east assembly station	MSA, M11	312	624	0.03		0.02
71A	Line A, north side, on rear of west assembly station	MSA, M8	305	610	0.02		0.01
72A	A. Chibani- shoe loader, Line A	Bendix B94	263	526	0.06		0.03
73A	M. Gagnier - inspector, Line B	Bendix B23	269	538	0.03		0.02
74A	D. Sutherland - buttering operator	Bendix B27	220	440	0.04		0.02
75A	S. Bajaa - wheel cylinder machine operator, Line A	Bendix B197	257	514	0.05		0.03
76A	G. Cooke - cleaner	Bendix B84	55	110	0.12	0.06	0.03
76B	"	"	92	184	0.02		
76C	"	"	57	114	0.07		
77A	A. Tortola - inspector, Line A	Bendix B51	159	318	$<$0.01		

$<$ = less than indicated value

EXHIBIT III

Ontario Ministry of Labour | Occupational Health Branch | Occupational Health Engineering Service

Table of Results

[x] Personal Samples
[x] Area Samples

Company: Bendix Automotive
Address: Argyle Rd., Windsor, Ontario

Date: Jan. 30/80 | Sheet No.: 1
OHB File No: 31980 AEOB-M | AOA File No:

Air Samples

Standard = 2 f/cc

Hazard: ASBESTOS

Sample No.	Employees Name and [x] Job Description or [x] Location	Pump Name and Code No.	Time Minutes	Volume Litres corrected for Temp-Press	Total Fibres Greater than 5 Micrometers in Length per cc of Air	TWA	CON'C TLV
1A	F. Vukobratic - cleaner (wore Willson Respirator R11 filter)	Bendix B170	103	206	0.08	0.05	0.03
1B	"	"	96	192	0.06		
1C	"	"	92	184	0.02	0.25	0.13
2A	P. Knuckle - rivetting machine operator, machine # 1	Bendix B153	91	182	0.33		
2B	"	"	196	392	0.22		
3A	M. Kennedy - grinding machine operator, grinder #1 (wore Willson respirator 3M # 8710)	Bendix B154	126	262	0.14	0.10	0.05
3B	"	"	161	322	0.07		
4A	S. Zan - rivetting machine operator, rivetter # 8	Bendix B152	281	562	0.13		0.07
5A	W. Westbury - production checker grinding machine # 1	Bendix B179	73	146	0.25	0.26	0.13
5B	"	"	93	186	0.27		
6A	M. Squire - rivetting machine operator, machine # 8 (Wore respirator 3M # 8710)	Bendix B156	71	142	0.80		
6B	"	"	99	198	0.33	0.46	0.23
6C	"	"	103	206	0.34		
7A	B. Durochar - production checker, grinding machine # 3	Bendix B130	281	562	0.07		0.04
9A	T. Hastings - stock man	Bendix B40	69	138	<0.01		
9B	"	"	96	192	0.14	0.08	0.04
9C	"	"	70	140	0.08		
10A	A. Skaff - repairman (wore respirator 3M # 8710)	Bendix B94	246	492	0.04		0.02

< = less than indicated value

[x] Personal Samples
[x] Area Samples

Address: Argyle Rd., Windsor, Ontario

OHB File No: 31980 AEOB-M

AOA File No:

Air Samples

Standard = 2 f/cc

Hazard: ASBESTOS

Sample No	Employees Name and [x] Job Description or [x] Location	Pump Name and Code No.	Time Minutes	Volume Litres corrected for Temp-Press	Total Fibres Greater than 5 Micrometers in Length per cc of Air	TWA	CON'C / TLV
11A	C. Parent - grinding machine operator, grinder # 3	Bendix B38	64	128	0.09		
11B	"	"	39	78	0.12	0.16	0.08
11C	"	"	50	100	0.29		
12A	M. Nagalingam - Hygiene Technician	Bendix B57	212	424	0.02		0.01
13A	Background - drilling area, on utility cupboard, west of drill # 1	MSA, M72	342	684	0,03		0.02
14A	Grinding area - on column west of grinder # 1	MSA, M74	128	254	0.07		
14B	"	"	101	202	0.01	0.05	0.03
14C	"	"	114	228	0.06		
15A	Grinding area - on column east of grinder # 3	MSA, M73	343	686	0.04		0.02
16A	Repair station - on north wall	MSA, M70	142	248	0.07		
16B	"	"	64	128	0.16	0.10	0.05
17A	Background - on partioning screen between asbestos processing area and tool room	MSA, M80	267	534	0.04		0.02
18A	Background - on column north of walkway, central location	MSA, M71	122	244	0.05		
18B	"	"	95	190	0.02	0.15	0.03
18C	"	"	110	220	0.11		
19A	Background - press shop on north wall	MSA, M23	314	628	0.02		0.01
20A	Background - press shop on south wall, west of webb press	MSA, M17	311	622	<0.01		

< = less than indicated value

0440 (6/78)

[x] Personal Samples
[X] Area Samples

Argyle Rd., Windsor, Ontario

OHB File No: 31980 AEOB-M

AOA File No:

Air Samples

Standard =2f/cc

Hazard: ASBESTOS

mple No.	Employees Name and [X] Job Description or [X] Location	Pump Name and Code No.	Time Minutes	Volume Litres corrected for Temp-Press	Total Fibres Greater than 6 Micrometers in Length per cc of Air	TWA	CON'C / TLV
21A	Men's shower/locker room, central	MSA, M8	292	584	0.01		
22A	Men's washroom, central	MSA, M11	288	576	0.02		0.01
23A	Toolroom, central	Bendix B23	284	568	<0.01		
24A	Department # 17, hydraulics, central	Bendix B24	271	542	0.01		
25A	Department # 17, set up/repair benches, central	Bendix B27	276	552	<0.01		
26A	Grinder # 3, inside exhaust hood	Bendix B197	64	128	0.14	0.14	0.07
26B	"	"	39	78	0.14		
27A	Repair station - on work bench	MSA, M70	141	282	0.03		0.02

< = less than indicated value

0440(8/78)

EXHIBIT IV

Ontario

Ministry of the Environment

Southwestern Region

Windsor District Office
250 Windsor Ave 6th floor
Windsor, Ontario
N9A 6V9
(519) 254-5129

February 4, 1980

Mr. G. L. Detenbeck, Manager,
Safety, Health & Security,
Bendix Automotive of Canada Ltd.,
Walkerville P.O., Box 2400,
Windsor, Ontario.
N8Y 4S3

Dear Mr. Detenbeck:

We acknowledge receipt of a copy of the report prepared following a Source Emission Survey at your Argyle Road plant. I have forwarded the copy to Mr. V. Ozvacic of our Source Testing Unit for his review to determine its acceptability.

Yours very truly,

J. D. Luyt, P.Eng.,
District Officer,
Industrial Abatement,
Southwestern Region.

JDL/lz

cc: V. Ozvacic
Windsor file

envirocon

ENVIRONMENTAL ENGINEERING AND ECOLOGICAL CONSULTANTS

Envirocon (Eastern) Ltd.
Toronto Office

January 21, 1980

Bendix Automotive of Canada Ltd.
945 Prince Road
Windsor, Ontario
N8Y 4S3

Attention: Mr. Detenbeck

Reference: Our project TE 2935

Dear Mr. Detenbeck:

Envirocon Report TE 2935 "Source Emission Testing" was submitted January, 1980.

This report presents the results of emission tests conducted at the Argyle Street plant of Bendix Automotive of Canada Ltd.

The purpose of the testing program was to determine whether asbestos emissions from the brake shoe grinder and drilling baghouse were in compliance with Ontario Ministry of the Environment asbestos guidelines.

Ontario guidelines are based on the one-half hour average concentration of the contaminant at a point of impingement. A point of impingement is a location at which the ambient air concentration is determined. In most cases, the point of impingement is chosen as the location off-property which will result in the highest concentration.

The guideline for asbestos is that the one-half hour point of impingement concentration of asbestos must not exceed 5 micrograms per cubic meter.

continued..........

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The maximum one-half hour concentration for asbestos was determined to be 0.09 micrograms per cubic meter.

This is a factor of 56 times below the applicable guideline.

Based on the results of the source emission tests and the dispersion calculation conducted in accordance with Ontario Ministry of the Environment guideline procedures the emissions from the baghouse serving the brake shoe grinder and drilling operation result in point of impingement concentrations well below current Ontario guidelines.

Yours truly

ENVIROCON (EASTERN) LTD.

J. Trought, P. Eng.
Manager

JT:ma

cc: Mr. J. Herman

EXHIBIT V

EPA/CPSC WORKSHOP ON SUBSTITUTES FOR ASBESTOS

July 14, 1980, Arlington, VA

NON-ASBESTOS FRICTION MATERIALS

by

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ABSTRACT

Friction materials for automotive brakes are complex composites containing three general types of ingredient materials: reinforcing fibers; modifiers that adjust or maintain friction level, wear rate, and noise properties; and organic resin binders. Historically, the foundation or major constituent of automotive friction materials has been asbestos fiber, so chosen because of thermal stability, friction level, reinforcing properties, availability, and relatively low cost.

Numerous substitutes for asbestos in conventional organic materials have been evaluated, including both naturally occurring and synthetic materials. Direct substitution of these alternative materials in conventional formulations has resulted in poor friction levels, friction instability, roughness, structural failure, increased noise, mating surface deterioration and/or front-to-rear vehicle brake imbalance. Complete reformulation, not simple substitution, is necessary to meet the numerous, complex performance requirements of consumers, manufacturers, and government standards, such as FMVSS 105-75 and FMVSS 121.

In the 1960's, a new class of friction materials, called semimetallics, was developed to meet severe braking requirements, primarily in heavy-duty disc brake and extreme duty truck block applications. Semimetallics operate satisfactorily against the ventilated cast-iron rotors in the smaller brakes of downsized cars, as well as against the solid rotors found in the lighter brakes of new front wheel drive vehicles. Semimetallics rely on steel fiber and powder metallurgy techniques for reinforcement, and do not require asbestos. The improved performance of

semimetallics compensates for their higher costs due to more expensive ingredients, higher specific gravity, and more costly processing requirements. Overall development took more than ten years from introduction to significant customer acceptance.

The characteristics of semimetallics make them extremely difficult and costly to process as a drum lining segment. Consequently, an additional new class of friction materials is under development, specifically for drum lining applications. Additional development effort is necessary, not only to confirm the performance characteristics of these new substitute fiber formulations, but also to develop new processing techniques. These new-type friction materials will be more costly, however, due to the ingredients and new processing techniques.

INTRODUCTION

Automotive brakes can be viewed, quite simply, as energy transformers. During a brake application, the friction material (stator) makes contact with the rotating drum or disc (rotor), creating a friction force resisting the relative motion between the two bodies. The energy of motion is transformed into heat energy, which is dissipated, primarily through the rotating member.

As one might expect, the friction material must operate in a rather hostile environment. Lining soak temperatures in excess of 400°C (750°F) are not unusual, and temperatures at the contact interface can exceed 850°C (1560°F). The nature of the on-the-road operating environment (dust, mud, salt, water, etc.) complicates the problem. The friction material must possess an optimized balance of characteristics, and maintain those characteristics throughout 20,000 to 40,000 miles of vehicle operation.

The fundamental characteristics of friction materials are listed in Table 1. Friction level must be adequate and stable over a wide range of operating speeds, application pressures, and temperatures, regardless of the conditioning and age of the material. Of particular interest are the fade/recovery characteristics, i.e., the ability to resist friction level deterioration when subjected to extreme elevated temperatures (the fade) and then to return to the pre-fade friction level on cooling (the recovery). The friction material must have good wear properties for long life, but it must also not cause excessive wear or grooving on the mating disc or drum. Excessive compressibility, noise and roughness (chatter, vibration, pulsation) must be avoided, and sensitivity to moisture must be minimized. Finally, the friction material must be capable of being manufactured with consistency at a reasonable cost.

Detailed definitions of these characteristics, and their interaction and interdependence, have been discussed at length by Aldrich and Jacko (1). In general, attempting to improve upon one characteristic often results in the deterioration of other characteristics. The development of friction materials is therefore a complex, interactive process seeking an optimized combination of interdependent characteristics.

The existence of numerous brake designs provides another level of complexity in designing friction materials. Linings for drum brakes require a wide range of properties. The duo-servo drum brake (the most popular U.S. design) requires two different types of linings, designated primary and secondary, each of which needs different properties of strength, wear resistance, friction level and friction stability. The non-servo drum brake (used on many sub-compact vehicles) requires a friction material which encompasses the best characteristics of the primary and secondary in a single formulation, with emphasis on low-

temperature properties and static friction capability. The large hydraulic and air-operated drum brakes utilized on medium and heavy trucks require, in general, the maximum properties of the smaller vehicle linings but at significantly higher operating temperatures. The arcuate form of drum brake linings places additional restrictions on the formulation, because of processing requirements.

Disc brakes demand a totally different set of operating conditions for the friction materials. Disc brakes generally operate at significantly higher temperatures than equivalent drum brakes, and the front disc brakes run hotter than the rear drum brakes on the same vehicle (Table 2). The friction material for disc brakes must be specifically designed for these higher temperatures, and must possess a higher coefficient of friction and better wear characteristics across the temperature range. Friction-material formulations must also be tailored to the specific needs of the particular vehicle application. Numerous parameters such as vehicle weight, front-to-rear brake balance, actuating system design, and duty cycle affect the capability of a particular lining formulation to perform satisfactorily.

The existence of numerous complex performance standards emanating from consumers, associations, manufacturers, and government agencies provides an additional set of parameters that friction materials must meet. Significant differences can exist between friction materials used as original equipment in new vehicles and friction materials available as replacement parts in the aftermarket. Each vehicle manufacturer has a unique, extensive set of test and acceptance standards to ensure the safety, durability, and performance of its products and the components used therein. Government-instituted requirements exist at the federal, state, and local levels. Federal requirements include those promulgated by the Department of Transportation (vehicle performance), the Occupational Safety and Health Administration (manufacturing work practices), and the Environmental Protection Agency (manufacturing practices and raw materials).

In order to meet the many characteristics outlined thus far, friction materials for automotive brakes have developed as complex composites containing three general types of ingredient materials: reinforcing fibers; modifiers that adjust or maintain friction level; wear rate and noise properties; and organic resin binders. Historically, the type of friction materials used in most automotive applications has been conventional organic friction material. The foundation or major constitutuent of conventional organic friction material has been asbestos fiber, so chosen because of its unique combination of characteristics. Asbestos fibers provide reinforcement, possess a high coefficient of friction, and more importantly, have excellent thermal stability. The openness of the fiber, its adsorptiveness, and its compactibility enhance the processing and uniformity requirements. Finally, asbestos fibers have been available in a variety of grades at a relatively low cost.

Once the friction material has been cured, the asbestos fibers are locked into the matrix. During brake operation, the high temperatures generated at the interface convert more than 99.7% of the asbestos to non-fibrous residues (primarily olivine) in the wear debris (2), and less than 0.02% asbestos becomes airborne (3,4).

The conventional organic formulations and the processes by which they are made have been dependent upon and tailored to the physical and chemical properties of asbestos. Two courses of action are open for elimination of asbestos from automotive friction materials:

1. Develop a new generation of friction materials, designed from the start without asbestos in mind.

2. Attempt to substitute an alternative fiber system for the asbestos in conventional formulations, with subsequent modification of composition and process techniques.

Bendix is aggressively pursuing both courses of action. As Mr. William Agee, our Chairman and Chief Executive Officer has stated, Bendix is committed to being asbestos-free at the earliest possible date within this decade.

SEMIMETALLIC DISC PADS

Properties

In the 1960s, a new generation of friction materials, called semimetallic, was developed to meet severe braking requirements which organics could not meet. Class A organics (typical U.S. materials), which perform well in low and moderate temperature duty, are prone to fade and exhibit compressibility and poor wear resistance at high temperatures. Class B organics (typical European and Japanese materials) provide good high-temperature wear and friction levels, but have poor low-temperature wear resistance, produce rotor scoring and/or wear, and are prone to being noisy. Semimetallics were initially developed for these extreme, high-temperature applications (5).

Semimetallics rely on steel fiber and powder metallurgy techniques for reinforcement. Various property modifiers are added to enhance performance to desired levels, with a resin binder holding the materials in a uniform solid mass. Semimetallics may contain metallic powder, sponge iron particles, ceramic powder, steel fiber, rubber particles, graphite powder, and phenolic resin (6,7). Some manufacturers utilize a backing layer of a different composition which can contain asbestos.

Problems Overcome

Inherent in the uniqueness of the semimetallic formulations and their performance properties were a number of significant problems which required resolution. Concentrated development effort was required to resolve both processing and performance related issues. Processing issues included: the uniformity of the raw materials mixtures, the ability to form and handle the in-process material, and the ability to manufacture high-quality parts consistently. Performance issues included: materials strength, cold friction properties, initial wear resistance, and attachment to the backing plate. The development effort on semimetallic friction material has been continuous, not only to further improve its characteristics and properties, but also to overcome the problems inherent in accomodating new vehicle applications.

Semimetallics gained acceptance because they were able to solve some of the problems that could not be overcome using Class A or Class B organics. The improvements/advantages are listed in Table 3. The key element is the attainment of overall excellent properties at both low and high temperatures. Semimetallics cost more because of more expensive ingredients and a costlier process, but the improved performance capabilities offset these factors. An increased usage of semimetallics has occurred over the past few years. The downsizing of vehicles, with resulting smaller front brakes and higher operating temperatures has given impetus to increased use of semimetallics (8). It is expected that the trend toward asbestos-free semimetallic disc pads will continue.

SEMIMETALLIC DRUM LININGS

An obvious alternative to conventional organic drum brake linings is the use of semimetallic material for drum linings. In fact, one of the first applications for semimetallics was for air brakes on heavy-duty trucks used in the logging industry -- an extremely severe application.

Significant development effort has been expended on semimetallic drum brake linings. However, the basic nature of semimetallics does not lend itself to the arcuate segment configuration required for small drum brakes. The semimetallic mix does not possess the necessary green strength, is difficult to bend into the arcuate shape, and is more brittle in its cured form and therefore subject to cracking. Modifications to the formulation to facilitate processibility generally result in a product that cannot achieve commercially acceptable performance characteristics.

These difficulties present a clear challenge, and development work on semimetallic drum brake linings continues.

ALTERNATE FIBERS/REINFORCERS

Properties

Alternative fiber systems in conventional organic formulations represent the second course of action open to friction-material manufacturers. Table 4 is a summary of the properties of some of the various materials which could be considered as alternate reinforcements. Since conventional organics and semimetallics have traditionally been reinforced with asbestos and steel fiber, respectively, these fibers are also included in the table for comparative purposes. The data in Table 4 were obtained from the material manufacturer's literature and extensive characterization data developed at Bendix. Characterization included scanning electron microscopy and x-ray energy spectroscopy (SEM/XES). The selection of suitable alternate materials must also consider the health and safety implication of the substitute fiber system. After considerable study of existing information, Bendix has chosen substitute materials which, in our judgement, are free from serious health implications.

Processing Conditions

Current organic friction materials have been developed around the unique properties of asbestos. Asbestos fiber bundles open during mixing and entrap the friction modifiers and resin, giving a consistent mix. The compactability of asbestos facilitates forming at room temperature with moderate pressure.

The non-asbestos fibers are much more difficult to handle. Most are very brittle and have little or no surface adsorptivity. High bulking and segregation occur during mixing. Spring back and low tack lead to weak structures. Combinations of additives and new processing techniques are required to overcome these problems and produce the cohesiveness necessary for manufacturing parts.

Performance Characteristics

The characteristics of the fibers can have significant influence on the performance properties of the final composite. Asbestos has a high, stable friction level, good adsorptivity for strength and wear resistance, and does not contribute to noise.

Substitute fibers generally show greater frictional instability, little or no surface adsorptivity, and/or significant contribution to both noise and mating-surface degradation.

NON-ASBESTOS ORGANIC DISC PADS

Failures on Direct Substitution

A commercial Class A organic disc pad formulation, similar to one reported earlier (9) and known to contain phenolic resin, asbestos fiber, organic friction particles (cashew and rubber dusts), zinc chips, and barytes was selected as a baseline composition. In a series of new formulations, the asbestos fiber was replaced with glass fiber, mica, mineral wool, Franklin fiber, a glass fiber/mica mixture, a glass/Fiberfrax/graphite fiber mixture, and a glass/Wollastonite fiber mixture.

The composites were run on an inertial dynamometer equipped with a Bendix-designed Series III disc brake loaded to 1000 lbs. Stops from 50 mph (80 kmph) at 3.66 mpsps (12 fpsps) deceleration were run at different initial brake temperatures up to 315°C (600°F). All fiber substitutions produced roughness followed by poor friction. Generally, the composites were structurally inadequate producing tear-out and poor wear resistance, in addition to roughess (Table 5). All formulations were considered failures. This led to the conclusion that simple direct substitution of alternative fiber systems was not practical.

Alternate Approach

A new baseline was selected with increased reinforcement content to better screen the following characteristics:

- processing
- strength
- performance (friction, wear, drum compatibility, and noise properties)
- cost

The initial objective was improved structural capability. A number of formulations were made using high fiber concentration. As shown in Table 6, the tensile strength results were very encouraging. The next step, which proved very difficult, was attaining a proper balance of friction and wear to go along with the strength.

Sample Dynamometer Results

A series of combinations of materials with a fixed ratio of glass fiber and the other reinforcements was evaluated on a sample dynamometer (Table 7). The results indicate that all of these reinforcement combinations are poor substitutes for asbestos fibers in that they exhibit poor friction, poor wear resistance, poor friction stability, or poor rotor compatibility. However, some clues were provided and it was possible to combine two of the formulations to produce a new composite M. This material was then reformulated with additional property

modifiers in 6 other iterations to produce yet another formulation S, which exhibited a high but stable friction coefficient, equivalent wear resistance, and slightly poorer rotor wear resistance. At this point, the study was transferred to full brake inertial dynamometer testing.

Inertial Dynamometer Results

The inertial dynamometer confirmed that formulation S had a higher friction level, slightly better wear resistance, and slightly poorer rotor compatibility than the baseline (Table 8). Approximately 40 iterations of formulation S led to formulation AA which gave good friction with friction stability and very good wear resistance. Further iterations (~10) led to formulation AL which gave lower friction, poorer wear, and good rotor compatibility. In addition to inertial dynamometer tests, a series of vehicle tests was also initiated.

Vehicle Test Results

Several formulation iterations were coupled with processing improvements. Formulation DA was developed after approximately 50 iterations following Formulation AL. Formulation DN was developed after 13 iterations of a new-concept material which has been patented (10). The vehicle test results (effectiveness, fade, and recovery, in addition to wear data and noise ratings) are given in Table 9 and were run according to a modified SAE J843c schedule. Formulation Bendix D7180 is a Class A organic used as the baseline.

The line pressure data show that the non-asbestos organics have higher preburnish, post-burnish, and final effectiveness than the baseline, based on full-system as well as fronts-only checks. This higher friction level and friction stability are also demonstrated in the fade and recovery portions of the test.

Both non-asbestos organics showed poorer burnish wear resistance, and both showed improved wear resistance during the fade and recovery portions of the test. The rotor compatability of both non-asbestos organics was poorer than that of the asbestos-based baseline.

Formulation DA, which is more typical of Class A organics, showed less loss in rotor wear than did the new-concept DN material. Both materials were prone to be noisy.

Status

Non-asbestos organic disc pads are still in the development stage because several problems have not yet been resolved:

- rotor compatibility
- wear durability
- noise properties
- processing

Bendix is continuing development efforts to commercialize non-asbestos, organic disc pads.

NON-ASBESTOS ORGANIC DRUM BRAKE LININGS

Process Characteristics

Drum-brake linings require different processing characteristics than do disc pads. When made by a wet process technique, friction materials require a binder-wetted plastic mass with good cold flow properties. When made by a dry process technique, they require good hot flow properties, but must first be capable of being preformed under cold pressure conditions to develop strength for handling purposes. Both wet and dry process types require the capability of ultimate arcuate formation. All currently known alternate fibers result in serious problems in these areas.

As in the case of disc pads, the direct substitution of alternate fiber in existing asbestos formulations has been unsuccessful. Basic processibility has been the first obstacle. The generally stiff, non-absorptive alternate fibers do not result in a wetted, densified mass. This precludes cold-pressure forming into brake-lining strip configurations typical of wet-process methods. In the case of dry-process methods, the fiber stiffness is a deterrent to good physical integrity of preforms and also leads to excessive lining cracking during bending. In general, the alternate fiber materials do not result in a mix character which allows them to be processed effectively by currently known techniques. The solutions to these problems call for radically different approaches to material formulation and processing techniques. The new processing techniques require substantial capital investment.

Testing and Development

With the application of suitable material and process changes, non-asbestos type drum linings have been experimentally fabricated and tested. Hundreds of formulations of duo-servo primary linings and secondary linings, along with those for non-servo type brake linings, have been made. When processed satisfactorily, these materials have been tested on sample dynamometers and inertial dynamometers before selecting the better ones for vehicle testing. The use of different formulations to overcome the process problems has resulted in substantially different frictional and wear characteristics which have had to be modified to duplicate current materials more closely.

Table 10 illustrates the magnitude of some of the early problems and some of the later results. Initial tests using very high friction combinations (A and B) run on Vehicle 1 with a front-brake hold-off valve, resulted in a serious duty shift with front brakes projecting greater than normal mileage, and the rear brakes projecting short life because of their higher work load. However, when Combination A was run

on Vehicle 2 (which had no front-brake hold-off valve), the secondary lining (the same as in Combinations A and B) projected almost the minimum requirement of 15,000, although the primary gave only 7900 miles. Subsequent tests of improved combinations, particularly with improved primary lining life, projected over 20,000 miles. Tests on Vehicle 3, again without a front hold-off valve, projected reasonably good life on Combinations E, F, G, and H, with quite acceptable life on the more recently developed Combination H. A comparison of wear projections on Combinations F and G shows the importance of primary-secondary teaming. Both combinations had the same primary, but with different secondaries, the life of the primary decreased from 20,900 to 12,200 miles.

The above data illustrates that basic life and performance are achievable, at least on certain vehicles. However, the materials noted above were prepared by more involved, more expensive processes and are noisier than current asbestos types, and the mating surface condition requires further improvement. Further, the ability of these materials to withstand extended in-service usage must be evaluated in a wide range of vehicle applications and environments.

Status

The first generation of asbestos-free drum linings is being evaluated by some vehicle manufacturers. Bendix is continuing development efforts on further improved materials.

ECONOMIC IMPACT

The economic impact of eliminating asbestos from automotive friction materials is significant, and includes three distinct segments:

1) Research and Development/New Capital Investment: Bendix has committed, and will continue to commit, extensive funding to both research and development efforts and to the new equipment and facilities required to support asbestos-free friction materials. Over the last five years, the number of dynamometers and test vehicles at our Friction Materials Division has doubled, and engineering headcount has been increased by over 60 percent. The total engineering budget has tripled, and the share of the budget devoted to asbestos-free product development has grown from 13 percent in 1976 to over 71 percent for 1981. The corporate research laboratories have also expended significant effort in support of the division. Based on our current plans, Bendix estimates that it will have committed over $25,000,000 to engineering activities on asbestos-free product in the U.S. by 1985.

   Capital expenditures must also be increased significantly. Over the next five years, the average annual expenditure related to asbestos-free products will be triple the historical average annual expenditure for the entire division. Based on our current plans, Bendix estimates that it will invest over $60,000,000 (1980 constant dollars) in new equipment and facilities for asbestos-free products.

2) Product Cost: The basic cost of the product itself is a complex function involving many factors. The amount and types of materials used, and the basic raw materials cost are obvious factors. The fixed and variable costs of manufacturing can differ greatly, based on the type of process and its complexity, production volumes, labor costs, energy cost, and process yield, among other factors. Administrative costs and handling/distribution costs are also significant variables.

   Preliminary cost estimates indicate that asbestos-free drum brake linings may cost 20% to 50% more than current linings. Disc brake pads may cost 20% to 100% more than current materials. These estimates are for products delivered in the original equipment market. We emphasize these are preliminary estimates. Until parts can actually be manufactured on production equipment in significant volumes, costing estimates must be preliminary. The estimates are highly dependent on the raw materials and processing techniques, which can vary significantly. Moreover, research and development continues, and future results can affect product cost.

3) Implementation Costs: As noted earlier, vehicle manufacturers have an extensive series of stringent test requirements. Each different vehicle configuration requires the series of tests to ensure that the product conforms to the requirements. Since asbestos-free materials may have some performance or property differences from current materials, vehicle system redesign may be necessary. We do not have sufficient information to accurately estimate costs associated with the test programs. We would expect that each vehicle manufacturer would expend millions of dollars, and possibly tens of millions, in converting their product lines to asbestos-free materials. A key element is the timing of the test programs. Expenses could be minimized by converting to asbestos-free materials as part of the scheduled new vehicle design programs, where significant brake-system testing is already necessary.

TIMING

Friction materials development is a lengthy process. As mentioned previously, the materials themselves and their properties are the results of optimization procedures, and the necessary testing programs are extensive. These programs include not only testing by the friction material supplier to develop and document the materials' capability, but also extensive testing by the customer to ensure suitability and regulatory conformance in the particular application.

Historical data gives us a sense for program timing. Evolutionary changes generally require eighteen to twenty-four months for supplier development and validation testing, twelve to eighteen months for customer application testing, and six months manufacturing lead-time--that is a total of 3 to 4 years. An example of such a change would be an improved organic disc pad utilizing the same basic components (i.e., asbestos, resin, modifiers). Compared to its predecessor, the new formulation might exhibit 15 percent better wear, improved fade resistance, and the same friction and noise properties. Today's asbestos organic linings are essentially the product of 40 years of evolutionary changes.

Revolutionary changes, which advance the state of the art, are more difficult to come by. It is unrealistic to put a timetable on invention, but establishing the feasibility of a new concept can take 12 to 18 months. Reducing that concept to a product with some or most of the basic characteristics can take 12 to 24 months. Formulation development to obtain a balanced set of characteristics for commercial application, and validation of those properties requires 24 to 36 months. As before, 12 to 18 months for customer application testing, and six months manufacturing lead-time are needed--that is a total of 5 1/2 to 8 1/2 years. The semimetallic discussed previously is a good example.

Semimetallic development began in 1962. The first low volume, special-purpose applications occurred in 1969. General acceptance came in the mid 1970s with the second generation of semimetallic formulations. Today, semimetallic disc pads are utilized on the front brakes of approximately 50 percent of the new vehicles built in the U.S., and projections approach 100 percent utilization by 1985. It has taken continued development and improvement of semimetallic properties to achieve this level of use.

The elimination of asbestos from automotive friction materials must be considered a revolutionary change. There are strong indications that the asbestos-free materials can achieve general acceptance more rapidly than semimetallics did. However, basic development needs demand a minimum time from the start of a program to initial production application. Assuming a 1975 start date, historical data would suggest that initial applications could be expected in the 1982/83 time frame, and we believe that we are close to that timetable. However, this only applies

to the first generation of asbestos-free materials. Continued engineering effort (evolutionary changes) will be required to develop both the second generation of materials with improved properties, and the multiplicity of types of formulations necessary for different applications.

As indicated earlier, semimetallic disc brake linings containing no asbestos in either the friction material or the backing layer are in use today. It should be pointed out that the semimetallic friction materials have some characteristics which may preclude their utilization in certain vehicle applications. An orderly transition to significantly increased utilization of semimetallic disc pads on new U.S. vehicles is in process, and will probably approach 100 percent utilization no later than 1985.

Development continues on both asbestos-free organic disc-brake linings and on semimetallic drum brake linings, but the timing for production implementation cannot be accurately predicted.

The initial generation of asbestos-free organic drum-brake linings is in the final development stage at Bendix, and initial evaluations are underway at vehicle manufacturers. Some asbestos-free blocks are available commercially for heavy truck applications. While it is too early to tell whether these formulations will achieve commercial success, the first significant production release would probably be in 1982.

Although this presentation has primarily addressed original equipment considerations, the use of asbestos-free materials in the automotive aftermarket will create additional challenges. As new vehicles are produced with asbestos-free friction materials, they should be serviced with asbestos-free products. However, since the asbestos-free materials may very well have property and performance differences compared to current friction materials, it may not be possible to substitute the asbestos-free materials directly in older vehicles without compromising safety. Hence, significant time and effort will be needed to evaluate the effect of new asbestos-free friction materials in aftermarket applications to ensure safe and efficient braking and adequate lining life prior to the release of these asbestos-free materials for use in the aftermarket.

SUMMARY

Automotive friction materials are complex composites that have developed around the properties of asbestos. There is no simple substitution for asbestos fibers in automotive friction materials. Extensive engineering programs are required to develop new asbestos-free formulations and process techniques, and to conduct testing to ensure the adequacy and safety of the new friction materials.

Semimetallic disc pads, originally developed for heavy duty applications, meet the criteria of being asbestos-free and are in use today. The trend toward significantly increased usage is well established. The first generation of asbestos-free drum linings for passenger cars and light trucks is in the final stages of development at Bendix, and in the initial stages of evaluation by vehicle manufacturers. If these asbestos-free drum linings prove to be commercially acceptable, initial limited production usage could occur as early as 1982. Some asbestos-free friction materials are currently available on the market for heavy truck applications.

Engineering programs continue on improved versions of the materials mentioned above, and also on other types of materials which might prove successful. Bendix is committed to developing asbestos-free alternatives, and an orderly transition to such materials is now taking place. Significant engineering effort and time is needed to accomplish this transition.

As stated in the Bendix Corporation's 1979 annual report, "...Bendix early in the 1980's will offer its automotive customers brakes made with long-wearing high-performance friction materials that are asbestos-free." We intend to meet that committment.

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TABLE 1

CHARACTERISTICS OF FRICTION MATERIALS

FRICTION

- o LEVEL (COEFFICIENT)
- o STABILITY - SPEED
  - PRESSURE
  - TEMPERATURE
  - CONDITIONING
  - AGE
- o FADE/RECOVERY

WEAR

- o FRICTION MATERIAL
- o DRUM OR DISC

NOISE

ROUGHNESS

MOISTURE SENSITIVITY

MANUFACTURABILITY

- o PROCESSIBILITY
- o UNIFORMITY

TABLE 2

BRAKE FADE TEMPERATURES*(°F)

(SUBCOMPACT FRONT WHEEL DRIVE VEHICLE)

	1ST SAE FADE** (10 STOPS)		2ND SAE FADE** (15 STOPS)	
	DISC FRONT	DRUM REAR	DISC FRONT	DRUM REAR
COMBINATION 1	780	300	870	360
COMBINATION 2	985	235	1030	240
COMBINATION 3	760	200	855	235

* TEMPERATURES MEASURED BEFORE THE LAST STOP. ACTUAL TEMPERATURES FOR DISC BRAKES ARE 80-180°F HIGHER, AS MEASURED BELOW THE RUBBING SURFACE. SURFACE TEMPERATURES ARE IN EXCESS OF 1600°F (870°C).

** SAE J843c

TABLE 3

IMPROVEMENTS OFFERED BY

SEMIMETALLIC DISC PADS

- IMPROVED ENERGY ABSORPTION
- FADE RESISTANCE
  - TEMPERATURE INSENSITIVITY
  - IN-STOP FADE
  - SPEED SPREAD
- FRICTION STABILITY (FMVSS 105-75)
- HIGHER TEMPERATURE CAPABILITIES (LIFE)
- ROTOR COMPATIBILITY
  - SCORING
  - HEAT CHECKING
- REDUCED NOISE
- SMALLER BRAKE SIZING

TABLE 4

CHARACTERISTICS OF REINFORCING AGENTS

NAME	ASBESTOS (5R04)	FIBERGLAS 497	MINERAL FIBER	SUZORITE MICA	FIBERFRAX (CHOPPED)	WOLLASTONITE	FRANKLIN FIBER	GRAPHITE WFA	CARBON WFA	SOLKA-FLOC	KEVLAR 29	STEEL FIBER
MANUFACTURER	JM, etc	OWENS/CORNING	U.S. PIPE AND FOUNDRY	MINED BY MICA SALES	CARBORUNDUM	MINED BY INTERPACE, NY	CERTAIN TEED	UNION CARBIDE	UNION CARBIDE	BROWN CO.	DUPONT	AMERICAN STEEL WOOL
COMPOSITION (WEIGHT PERCENT)	$3MgO \cdot 2SiO_2 \cdot 2H_2O$ SiO_2 MgO	E GLASS SiO_2 54.5 Al_2O_3 14.5 CaO 17.0 MgO 5 B_2O_3 8.0 Na_2O 1.0	SiO_2 42 Al_2O_3 8 CaO 38 MgO 8 Other 7	SiO_2 41 Al_2O_3 11 MgO 21 K_2O 10 FeO 8 Other 4	SiO_2 47 Al_2O_3 51 Other 2	$CaSiO_3$ $CaO \cdot SiO_2$ SiO_2 51 CaO 47 Other 2	$CaSO_4$ WHISKERS	99.5% C	91%C	CELLULOSE	AROMATIC POLYAMIDE 100% AROMATIC	SAE 1010 C 0.1 Mn 0.4 S 0.1 Fe 99.4
COST ($/LB)**	1.0	3.0	1.9	0.8	5.9	1.0	0.8	90.9	29.6	1.2	19.0	2.7
SHAPE LENGTH (um) DIAMETER (um) ASPECT RATIO	FIBER 250+ 0.025* 10,000+	FIBER 3175+ 13 240+	FIBER 20 1-10 40-60	PLATE 3175+	 300 2 100	FIBER - - 15	FIBER 90+ 2 25+	FIBER 6360+ 8.4 750+	FIBER 6350+ 11 575+	FIBROUS 70 18 4	FIBER 6360+	FIBER 800-2000 90-100 10+
SPECIFIC GRAVITY	2.50	2.6	2.7	2.7	2.73	2.9	3.0	1.8	1.	1.4	1.45	
TENSILE STRENGTH(PSI) AVG:	200-800 KPSI 300 KPSI	450-550 KPSI 500 KPSI	3-80 KPSI 70 KPSI	33-37 KPSI	400 KPSI	-	300 KPSI	120 KPSI	30 KPSI		400 KPSI	
THERMAL STABILITY: UPPER USE TEMP(°F) Tg (°F) Tsoft (°F) Tm (°F)	 1200 - - 1600	 1300 1350 2000	 1000 1400 2300	 2900	 2300 - -	 1200 1200 (tr) 1500	 1000 2100 (tr) 2600	 1200	 1000	 ~400		 ~1000F ~2500F
HARDNESS (Moh)	3.0 - 4.0	5.5		2.5 - 3.0		4.5	~3.5	~1.0	~1.0	1.0	1.0	~5.5
MISCELLANEOUS INFORMATION		SILANIZED	ALSO MINERAL WOOL			SILANIZED FORM AVAILABLE	SLIGHTLY SOLUBLE WATER 0.1gm			5-7% MOISTURE	KEVLAR 49 EVALUATED EARLIER	

*FIBRIL DIAMETER
**RELATIVE TO ASBESTOS

TABLE 5

DIRECT SUBSTITUTIONS AND THEIR FAILURES

FORMULATION	REINFORCEMENT	STRENGTH	PERFORMANCE
BASELINE	ASBESTOS	o STRONG NO DEFECTS	o STABLE FRICTION GOOD WEAR RESISTANCE
b,c,e	GLASS	o PAD SURFACE TEAROUT	o ERRATIC FRICTION, FADE, HIGH PAD WEAR, AND SCORED ROTOR
d	MICA	o PAD SURFACE AND EDGE TEAROUTS	o GOOD FRICTION, SL FADE, HIGH PAD, AND ROTOR WEAR
f	GLASS/MICA	o WEAK	o POOR FRICTION, FADE, AND INNER PAD WEAROUT
g	GLASS/FIBERFRAX/GRAPHITE	o STRONG	o ROUGHNESS, FADE, ACCEPTABLE PAD WEAR, AND SCORED ROTOR
h	GLASS/WOLLASTONITE	o PAD SURFACE TEAROUT	o IN-STOP FADE, ACCEPTABLE PAD WEAR, AND SCORED ROTOR

TABLE 6

TENSILE STRENGTH DATA

FORMULATION	REINFORCER	TENSILE STRENGTH (PSI) MIN	AVG	MAX
BASELINE	ASBESTOS	3100	4000	4600
A	GLASS FIBER	3400	4800	6350
B	MINERAL FIBER	600	1300	1850
C	WOLLASTONITE	850	1500	2350
D	SUZORITE MICA	850	1400	1750
E	GLASS*	2750	3500	3750
B'	SILANIZED MINERAL FIBER	2900	3150	3250

*REDUCED CONTENT

TABLE 7

SAMPLE DYNAMOMETER TEST RESULTS

FORMULATION	REINFORCER(S)	250F		450F		650F		250R+		ROTOR WEAR
		μ	W*	μ	W	μ	W	RF	RW	
BASELINE	ASBESTOS	0.32	0.002	0.28	0.004	0.30	0.022	1.00	2.62	0.0000
A	GLASS FIBER	0.32	0.005	0.23	0.010	0.16	>0.080	1.31	1.70	0.0003
F	WOL/GF	0.33	0.004	0.34	0.009	0.16	>0.040	1.16	1.68	0.0003
G	MICA/GF	0.49	0.004	0.19	0.010	0.22	>0.060	1.08	2.31	0.0001
H	MF/GF	0.32	0.004	0.17	0.012	0.16	>0.080	1.37	-	0.0001
J	FRAX/GF	0.36	0.009	0.45	0.013	0.50	>0.200	-	-	>0.0005
K	FF/GF	0.36	0.003	0.50	0.005	0.32	0.016	1.75	2.07	0.0001
L	SOFL/GF	0.35	0.002	0.18	0.003	0.18	>0.080	-	-	0.0000
M	PROPRIETARY	0.35	0.002	0.22	0.003	0.18	-	1.20	1.12	0.0001
S	PROPRIETARY	0.45	0.002	0.45	0.006	0.46	0.018	1.04	2.27	0.0001

* ALL WEAR FIGURES ARE IN INCHES

+ RERUN USED TO PROVIDE RELATIVE FRICTION (RF) AND RELATIVE WEAR (RW) TRENDS AFTER HIGH TEMPERATURE OPERATION

TABLE 8

INERTIAL DYNAMOMETER TEST RESULTS

	BURN		300F		450F		600F		300F		ROTOR
	LP*	W**	LP	W	LP	W	LP	W	LP	W	W
BASELINE	380	0.004	660	0.003	700	0.009	490	0.028	470	0.007	.0000
S	400	0.003	400	0.003	300	0.008	280	0.018	-	-	.0007
W	400	0.003	400	0.003	350	0.007	300	0.015	-	-	.0004
AA	400	0.002	370	0.002	340	0.006	390	0.008	440	0.003	.0003
AD	420	0.003	650	0.003	600	0.012	450	0.037	330	0.006	.0002
AL	440	0.003	510	0.002	580	0.008	430	0.034	270	0.004	.0000

* ALL LINE PRESSURES ARE IN PSI

** ALL WEAR FIGURES ARE IN INCHES

TABLE 9

VEHICLE TEST RESULTS

(1977 FULL SIZE STATION WAGON LOADED TO 5540 LBS)

FRONTS*	CLASS A ORGANIC D7180 30 MPH (48 KMPH)	CLASS A ORGANIC D7180 60 MPH (97 KMPH)	NON-ASBESTOS ORGANICS DA 30 MPH (48 KMPH)	NON-ASBESTOS ORGANICS DA 60 MPH (97 KMPH)	NON-ASBESTOS ORGANICS DN 30 MPH (48 KMPH)	NON-ASBESTOS ORGANICS DN 60 MPH (97 KMPH)
PREBURNISH EFFECTIVENESS**						
FULL SYSTEM	500	500	440	460	440	400
POST-BURNISH EFFECTIVENESS**						
FULL SYSTEM	600	600	520	530	500	420
FRONTS ONLY	1180	970	1020	900	620	620
1ST SAE FADE (10 STOPS)** MAX	-	1100 MAX	-	1000 MAX	-	1000
(RECOVERY - 10)	(410)	-	(380)	-	(320)	-
2ND SAE FADE (15 STOPS)** MAX	-	800 MAX	-	800 MAX	-	880
(RECOVERY - 10)	(410)	-	(360)	-	(340)	-
POST-FADE EFFECTIVENESS**						
FULL SYSTEM	600	500	450	460	420	460
FRONTS ONLY	900	670	960	850	700	920
WEAR (MILS)						
BURNISH (F/R)	6/6		11/9		11/6	
FADES (F/R)	42/3		33/3		22/2	
TOTAL PADS (F/R)	48/9		44/12		33/8	
TOTAL ROTOR	0		1.0		1.5	
NOISE RATINGS						
FRONTS	10		8		6-8	
REARS	10		10		10	

* ALL TESTS USED SAME REARS (BX4641A/H3133)
** LINE PRESSURES NEEDED FOR 15 FPSPS DECELERATION PER SAE J843C

TABLE 10

LIFE TESTING ON VEHICLES

	Rear Lining Combination*	Front Disc Pad Life (Miles)	Rear Drum Brake Primary Life (Miles)	Rear Drum Brake Secondary Life (Miles)
Vehicle 1				
	A	59,600	3,700	8,200
	B	44,500	6,600	5,900
Vehicle 2				
	A	31,400	7,900	14,500
	C	33,200	20,700	26,800
	D	27,600	28,300	20,400
Vehicle 3				
	E	31,100	17,600	15,900
	F	34,800	20,900	16,900
	G	28,100	12,200	18,700
	H	21,450	32,800	27,400

* Same type front disc pads for all tests.

EXHIBIT VI

Ministry of
~~HEALTH~~ LABOUR

Ontario

ISB File No.
OHP.B File No. 8E-24
A.Q.A. No: 457

OCCUPATIONAL HEALTH ~~PROTECTION~~ BRANCH

June 1977

AIR QUALITY ASSESSMENT REPORT

Ontario Department of Labour
JUL 14 1977
WINDSOR

Date: June 27, 1977

From. C. Rhodes

Plant: Bendix Company	Requested by: I.H.S.B.
Address: 1473 Argyle Avenue Windsor, Ontario	Accompanied by: Mr. F. Gamble, I.S.O.
Contacts: Mr. G. Detenbeck - Industrial Relations Administrator	Date of Visit: June 9, 1977
Hazard: Asbestos	Copies to: Dr. V. Tidey Mr. G. Rajhans Dr. J. Vingilis (2) Mr. H. Hendrickson Mr. J. Greenlaw (3) Mr. S. Morton (2) Mr. G. Detenbeck

Abstract: Area and Personnel air samples were taken in the above plant, and the following table lists their locations and results.

Personnel Samples

Sample Number	Employees Name	Job Description	Sample Time in Minutes	Sample Volume Litres	Asbestos fibres greater than 5 micrometers in length per cc of Air
1.	Ms. Mary Bennett	No. 4 Grinder operator (day shift)	32	64	0.3
2.	Mr. R. Stan	No 4 Grinder operator (afternoon shift)	41	82	0.5
3.	Mr. Reaume	No 4 Production Checker (afternoon shift)	36	72	0.9
4.	Mr. G. Marra	No 3 Grinder operator, (afternoon shift)	37	74	0.9
5.	Mr. B. Zakala	No 3 Production Checker (afternoon shift)	37	74	0.6
6.	Mr. V. Iich	Changing Dust collector waste box	7*	14	1.5

Area Samples

Sample Number	Location	Sample Time in Minutes	Sample Volume Litres	Asbestos fibres greater than 5 micrometers in length per cc of Air
1.	On Pillar, between #2 and 3 Grinders (near end of day shift)	34	68	1.2
2.	On Pillar, between #2 and 3 Grinders (over shift change into afternoon shift)	77	154	0.3

* This operation takes place over a duration of from 5 to 10 minutes, depending on the amount of spillage in the enclosure, and could occur twice a shift, dependant on the amount of production.

The present Ontario standard for asbestos fibres is, 2 fibres greater than 5 micrometers in length per cubic centimeter (cc) of air. None of the eight samples were above this limit.

Observations

Housekeeping at the time of my visit was fair.

The dust collector is outside, adjacent to the grinding room.

The doors to the enclosure of the dust collector, containing the waste box, appeared to be in need of repairs.

At the time of sampling, the waste box was only half full. Normally it is from three quarters full to full, before it is changed.

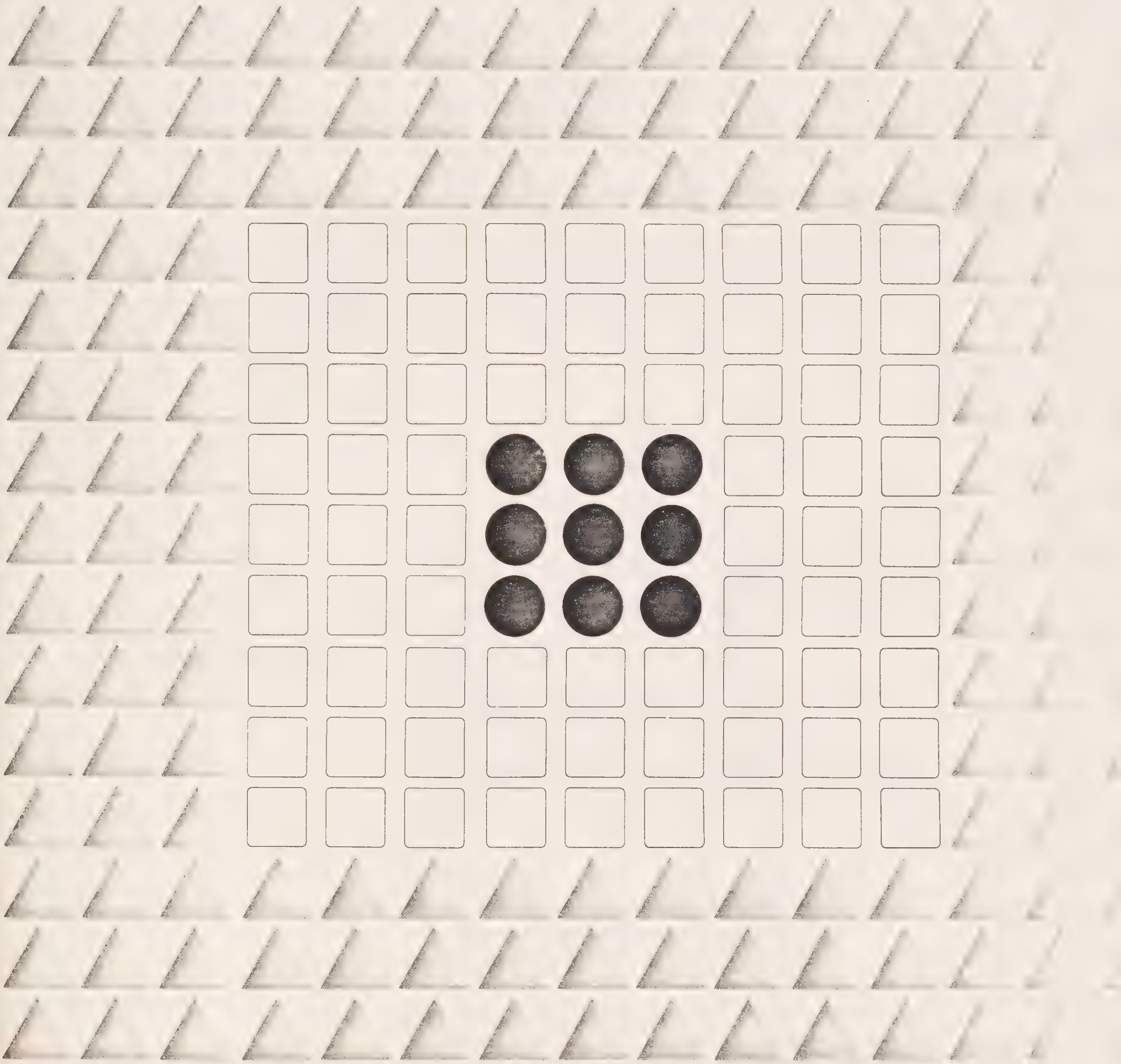
Wind direction was out of the west at approximately 5 to 10 knots, with no precipitation.

CR:lm

C. Rhodes

Ontario
Ministry of
Labour

Occupational
Health and Safety
Division



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SUPPLEMENTARY BRIEF
OF
THE ONTARIO MINISTRY OF LABOUR
TO
THE ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY
ARISING FROM THE USE OF ASBESTOS IN ONTARIO
MARCH 1981

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SUPPLEMENTARY BRIEF

OF

THE MINISTRY OF LABOUR

TO

THE ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY

ARISING FROM THE USE OF ASBESTOS IN ONTARIO

Introduction

1. The Ministry's initial brief (February 1981) gave an overview of its responsibilities and activities in controlling worker exposure to asbestos. It was recognized that, as the Commission's work progressed, the Ministry might wish to make more detailed statements on specific topics. Two on which supplementary submissions seem appropriate are:

- studies to develop more reliable information on the relationships between the work experiences and health experiences of Ontario workers; and

- the asbestos control program in the Province's schools.

The material presented on the second topic refers mainly to the role of the Ministry of Education.

Studies Relating Workers' Employment and Health Experiences

2. In the area of occupational health, recent efforts to provide more satisfactory protection to workers have identified new information requirements. They become evident as demands for better health protection on the job and cost constraints combine to make necessary both more precise definition of hazards and more sharply targeted control measures. This need for information is illustrated by the constantly changing views, worldwide, about levels of asbestos exposure

which can be tolerated at work and about meaningful measurement of them. The Ministry's earlier discussions with the Commission about "control limits" and methods of analysis for airborne asbestos are cases in point. However, similar illustrations can be found with respect to other substances or conditions which create occupational health hazards.

3. The Ministry recognizes the need for Ontario based study and research on occupational health as a source of policy development information. Such work has been in progress since the early years of the last decade and is intended to complement that available from other jurisdictions. However, it was the Royal Commission on the Health and Safety of Workers in Mines (The Ham Commission) which fully outlined the need for scientific observation of the health experiences of our own workers. That Commission recommended a range of studies to assess the health of Ontario mine workers. Some of these were to be periodic health reviews at intervals of two to five years; and others were to be studies to obtain new knowledge about the development of occupational diseases. The Commission saw the studies as having a twofold benefit in that they would provide information that would be immediately useful in guiding enforcement, compensation and other decisions made under occupational health and safety programs and, at the same time, improve the information base for developing policies and control measures for the future.

4. Prior to the consolidation of occupational health and safety functions in the Ministry of Labour, the Ministry of Health and the Workmen's Compensation Board completed in 1974 a study of lung cancer among uranium miners. The findings of

that project and of additional work done for the Ham Commission gave rise to the concept of an epidemiological study of all Ontario miners. Planning for such a study began in 1975 and by late 1976, the work was well underway as a joint project of the Ministry and the Workmen's Compensation Board.

5. The first requirement was to assemble an information base. An essential part of this consisted of a nominal roll of Ontario miners, including asbestos miners, and their employment and health histories. These records had to be matched against newly developed and computerized death records held by Statistics Canada. Only through this process could the full picture of all deaths related to mining exposures be obtained. However, the Statistics Canada records were reasonably accurate only from 1955 onward and the file refers to the years since that date.

6. The case histories were compiled from a number of sources. Important among these were Workmen's Compensation Board files and chest X-ray and fitness certificate records of the Ontario Miners Chest Stations operated by the Ministry of Health. Much additional information had to be fed into the data base including any that would help to ensure certain identification of each worker, names of employers, periods of employment, data on the environmental conditions in the mines where this employment was located, and reports of exposure to radiation and other health hazards. By June 1980, the file contained such information on 16,000 uranium miners and on an additional 35,000 non-uranium miners.

7. These records will continue to increase in number and

will be a source from which the sorts of studies recommended by the Ham Commission can be undertaken. They will allow rapid retrieval and comparison of almost any combination of factors relating to a miner's health history. This will provide insight into the positive and negative effects of this experience and assist in determining what measures might be appropriate to better protect workers in the future.

8. The brief outline of the "Miners Study" will indicate to the Commission the nature and magnitude of the task of analyzing Ontario work and health experience to guide program and policy decisions. Nevertheless, somewhat similar projects are being undertaken on workers who have been exposed to asbestos. Three of these are well advanced - one is a mortality study of workers in Ontario who have been compensated for asbestosis; the other two are attempting to explore exposure-response relationships by studying in one case the mortality experience and, in the other, the incidence of asbestosis among long-term employees of the Canadian Johns-Manville Company Limited in Scarborough. The resulting information should be useful to all concerned in developing positions on what control measures are appropriate.

9. A fourth study of asbestos exposure has just begun and is based on the former employees of Bendix Automotive of Canada Limited. This company made vehicle braking systems in Windsor for many years and closed down in August 1980. Approximately ten percent of the total work force was involved in drilling, riveting or grinding brake linings which contained 50 to 60 percent asbestos. These operations generated some waste,

including asbestos dust, in the area where the work was done, Department 25 of the company's Argyle Road plant. The levels of asbestos contamination in the air in this Department were measured by the Occupational Health Branch on five different occasions between 1975 and August 1980, and all the samples taken were below the provincial control limit of 2 fibres greater than 5 micrometres in length per cubic centimetre of air. Despite these results, concern about exposure to asbestos developed with respect to all parts of the manufacturing process including those located in a second plant on Prince Road where the parts made at Argyle Road was assembled into braking systems.

10. The Bendix Company initially proposed that the study be done jointly by S.R.I. International and the Ministry of Labour. The discussions about this proposal were brought to the attention of officers of the UAW, Local 195, which had represented the workers. The union spokesmen expressed a strong preference that the Ministry conduct an independent study, a preference supported by the Ministry. Therefore, when the company agreed to make its records available, the Ministry was in a position to proceed with the analysis independently of the S.R.I. project and to ensure that it was designed and controlled in Ontario.

11. The work will be undertaken in two phases. The objective of the first phase is to determine whether there are any unusual mortality rates among the former Bendix employees. This will be accomplished by doing a mortality search and analyzing the causes of death in comparison with those of

the Windsor, and perhaps the Ontario, population. If the first phase of the study indicates abnormally increased mortality rates for any given causes, a second will investigate relationships between these causes of death and work experience. Regardless of the outcome of the first phase of the study, it may provide useful information on the extent of the health hazard arising in a manufacturing operation having a localized source of exposure to asbestos.

12. The company employment records identify the names of about 8,000 workers, their periods of employment and salaries. They do not indicate where the workers were located in the two plants and, therefore, have limited use. However, it has been concluded that the best results will be obtained by concentrating the study on workers who were employed at least twelve months in the Bendix operations. An index of these workers has been compiled and they number more than 2,000.

13. It is the Ministry's intention to supplement the information in company records from union and other sources. The union's last seniority list has been obtained. Also, discussions will be held with union and company representatives to determine the extent to which they can provide or lead us to information on which workers were involved in the drilling, rivetting and grinding work in Department 25 and those doing other tasks. To advance this approach, the Ministry is contemplating asking the union to circulate a questionnaire to former Bendix workers to obtain information on where they worked in the two plants, job titles and other variables. This work is

in the early stages and we are optimistic that it will improve the data base available for the study.

14. Once satisfactory information is obtained on the basic list of Bendix workers, it will be matched with Statistics Canada death records. At the same time, other sources, such as driver's licence records and telephone directories, will be used in an attempt to establish which members of the cohort of workers studied are still alive. Because we have excellent co-operation from both the union and the company in developing the data base, we expect that it will be possible to obtain valid results.

15. The Ministry wished to inform the Commission about the work outlined because it is a relatively new phase in developing an information base for the improvement of occupational health policies and practices.

Control of Asbestos Exposure in Schools

16. Controlling exposure to asbestos in schools is a shared responsibility of the School Boards across the Province and several ministries. Because the sharing arrangement is somewhat complex, the brief will define the parts played by the two Ministries most immediately concerned - Education and Labour. Although there may be an interest in charges laid under The Occupational Health and Safety Act, 1978 arising out of the asbestos exposure control activities of the Windsor School Board and Local 27 of the Canadian Union of Public Employees, this matter is before the courts and, for that reason, comment on it would not be appropriate.

17. The Ministry of Labour carries the government responsibility - defined in The Occupational Health and Safety Act, 1978 - for protecting people against health and safety hazards in the workplace. Therefore, unless they are specifically exempted from coverage of the Act, workers in the schools are under the Ministry's health and safety jurisdiction. Currently, teachers are so exempted but other school employees, for example, secretaries, maintenance staff and operating engineers, are covered. This arrangement leaves the Ministry of Labour directly responsible for an important but relatively small part of the total asbestos exposure problem in Ontario schools.

18. The work exposure to asbestos in school facilities has been assessed as considerably less serious than in situations where the material is mined, manufactured, or used or removed in construction. In these latter activities, a constant effort is required to maintain air contamination levels at or below the present "control limit" of 2 fibres per cubic centimetre, whereas, inspection and air sampling in a few of the schools with the greatest concentrations indicate levels of one-tenth to one-twentieth of this occupational exposure limit. Also, the results of air sampling in schools in the State of Massachusetts showed most of the results as below 0.04 fibres per cubic centimetre of air[1].

1. "Asbestos Exposure in Massachusetts Public Schools"; American Industrial Hygiene Association Journal, Vol. 41; April 19, 1980; page 270.

19. The primary concern about asbestos in the schools relates to students and the responsibility for ensuring that they are not unnecessarily exposed to health hazards rests with the School Boards under the leadership of the Ministry of Education. The asbestos control program, begun in June 1979, is based on a request of the Ministry of Education to the Boards to take all necessary protective measures to ensure that students and staff are protected against exposure to asbestos. In addition, the Ministry of Education has encouraged the Boards to take effective control measures by providing information and financial assistance for eliminating asbestos hazards.

20. The Ministry's authority for undertaking the program is grounded in The Education Act, 1974. Specification in the Act of the "duties and powers" of School Boards and of the duties of a school principal set out the following statements which provide a basis for the program. The sections in question are as follows:

> 146. "Every board shall,
>
> 7. keep the school buildings and premises in proper repair and in a proper sanitary condition, provide suitable furniture and equipment and keep it in proper repair, and protect the property of the board";
>
> 230. "It is the duty of a principal of a school, in addition to his duties as a teacher,
>
> (j) to give assiduous attention to the health and comfort of the pupils, to the cleanliness, temperature and ventilation of the school, to the care of all teaching materials and other school property, and to the condition and appearance of the school buildings and grounds."

In addition, in the case of extreme emergency, the Minister of Education has the power to close schools (as outlined in an

attached memorandum designated Appendix I). Also, this power would be used reluctantly and only in a situation in which the local authorities were clearly in dereliction of their responsibilities.

21. In summary, the control program in the schools has consisted of:

- preliminary identification of the presence of asbestos by an engineer, architect or a person with extensive experience in building;
- verification of the preliminary identification by analysing bulk samples in a laboratory;
- assessment of how to control the source of exposure by qualified persons as noted in the first point above;
- in most instances, submission to the Ministry of Education of the proposed control measures for approval of capital grants; and
- execution of the control work by a contractor or by the School Board staff.

22. The program got underway in June 1979 when the Ministry of Education asked the Boards to complete a survey for the presence of asbestos in their facilities. There was a better than 90 percent response to this request and it revealed the presence of asbestos in 732 schools. In about 50 percent of these the material was present in a friable and exposed form, mainly in ceilings and plenums. The ways of conducting the survey and verifying the presence of asbestos were outlined to the Boards by Ministry staff but the final responsibility for reporting on conditions in the schools remained with Board officials (Appendix II(a), (b), and (c)).

23. The Ministry of Education urged the Boards to give priority to "projects that are considered an immediate urgency." To encourage action, it made financial assistance

available on the sliding scale basis of its Capital Grants Program (Appendix III). By mid-March 1981, projects for removal, encapsulation or isolation of asbestos had been approved in 393 schools. This took up $7.89 million of a $10 million Ministry allotment for the fiscal year 1980/81. In addition, it is believed that some Boards have acted without requesting Ministry assistance. To ensure that the program continues during the 1981/82 fiscal year, the Ministry has allocated $13 million to support School Board initiatives.

24. The fundamental criteria on which the Ministry of Education makes decisions to finance removal, encapsulation or enclosure of asbestos are effective control and cost. Encapsulation or enclosure are preferred by the Ministry where they will provide protection. Generally this is where the asbestos is bound into materials, such as, plaster, tiles, wall panels, well adhered fire proofing or when it is in locations to which entry is infrequent. Removal is recommended where asbestos is likely to be released from insulation that is subject to vibration, is located in or near ventilation facilities and, therefore, likely to cause widespread contamination if distributed, or is too friable to control. The criteria are defined in greater detail in Appendix IV.

25. Where asbestos was used as heat and fire insulation, removal of it requires replacement by another heat resistant material. The Ministry and School Boards maintain close contact with the Public Safety Division of the Office of the Fire Marshal to ensure that the substitute materials used have required insulating characteristics. Appendix V lists such materials already used for this purpose in schools and

Appendix VI is a statement from the Fire Marshal's Office indicating what products are acceptable from a fire safety point of view for replacing asbestos in buildings.

26. The Ministry of Education also monitors the safety and effectiveness of materials used by the Boards to encapsulate asbestos. A list of approved encapsulants formed part of the guideline for controlling asbestos released early in 1980 by the Ministries of Education and Labour and entitled, "Inspecting Buildings for Asbestos" (Appendix VII). Before a sealant material is approved by the Ministry, it must have met the specifications of the United States Environmental Protection Agency. Tests to these specifications must be performed by a reputable laboratory and the Fire Marshal's endorsement obtained.

27. The laboratory tests are primarily for surface burning characteristics, penetration, flexibility, water vapour permeance and impact resistance. Currently, the Environmental Protection Agency specifications do not deal with the health effects of asbestos substitutes or encapsulant materials.
In Ontario, a mechanism has been established by the immediately involved Ministries to ensure that new information on the health effects of building materials is made available promptly. The mandate and procedures of a recently created interministerial committee, chaired by the Ministry of Consumer and Commercial Relations, are attached (Appendix VIII).

28. Finally, the program requires a number of contractors qualified to remove asbestos from buildings or take other remedial measures. The Ministry of Education emphasizes to the Boards the need to contract with firms which have experience or special training in such work. Partly on the urging of

Ministry of Education staff, the Ontario Research Foundation has established a course to train people in this area. The Foundation was assisted in the task by the Battelle Institute which is closely associated with the Environmental Protection Agency in resolving asbestos exposure problems. It is understood that twenty-three Ontario contractors have attended the course to date.

29. As already outlined to the Commission, the Ministry of Labour has areas of expertise which have been made available to the Ministry of Education and the School Boards in their efforts to control asbestos exposure in schools. In particular, extensive use has been made of Labour's Occupational Health Laboratory for analyzing bulk samples of materials suspected of containing asbestos. Other ministries have also assisted with the result that the program has demonstrated a flexible use of government resources and effective inter-agency co-operation.

MARCH 25, 1981

A P P E N D I C E S

Ministry of Education

Ontario

APPENDIX I

Memorandum

To: S. T. Orlowski, Grants Policy Branch

Date: March 12, 1981

From: R. A. Copeland

Telephone: 5-2473

Subject: Ministerial Powers to close schools to protect staff and students from exposure to uncontrolled asbestos

File number:

The basic power of the Minister to close schools is to be found in section 5(1) of the Act which is as follows:

> "Subject to the approval of the Lieutenant Governor in Council, the Minister may order the closing of a school or any class thereof for a specified period."

We have been unable to find any general Order in Council approving in advance the closing of schools as desired by the Minister. No doubt the interpretation that has been placed on that subsection is that the Minister would seek approval to close a specific school or schools as the occasion required.

Basically the power to close schools resides with school boards under section 18 of The Education Act, 1974. That power is based upon the existence of an emergency that would cause or be likely to cause health and safety risks to staff and students. The duty to report upon such conditions is imposed upon the principal of the school under clause f of subsection 2 of section 12 of O.Reg. 704/78 and generally speaking the authorization to close the school referred to in section 18 is granted to the chief executive officer of the board.

In the case of district school area boards in Northern Ontario, section 28 of the Act permits the Provincial School Attendance Counsellor to act in certain circumstances and his powers under that section would include the closing of schools in the circumstances indicated above where the board did not act so to do.

Accordingly it is clear that the primary responsibility in this area resides with school boards and their officials and the Minister and the Provincial School Attendance Counsellor are authorized only in the failure of those primarily responsible to exercise their powers as required.

R. A. Copeland
Director, Legal Services
Education.

RAC:mja

Ministry of Education
Ontario

APPENDIX II (a)

Memorandum

1979:SB19

To: REGIONAL DIRECTORS OF EDUCATION
DIRECTOR OF COLLEGE AFFAIRS BRANCH
CO-ORDINATOR UNIVERSITY RELATIONS OFFICE

Date: June 25, 1979

From: J. Martin - Director

Telephone: 5-2308

Subject: Asbestos Hazards

File number: 400.01

This Branch has been requested by the Minister to have undertaken a survey of all school, college and university buildings to ascertain asbestos hazardous conditions. It would be appreciated if you would initiate a survey of the facilities within your jurisdiction to gather the following data:

a. Name of the institution, building and year of construction.

b. Use of exposed asbestos in the form of sprayed surfaces, wall boards, counter tops, etc. and approximate extent of the application.

c. Plans for a remedy to the existing condition.

Your reply by August 31st of this year will be appreciated.

James Martin
Grants Policy Branch

cc. Superintendents of Business and Finance

APPENDIX II (b)

Ontario

Ministry of Education

Mowat Block, Queen's Park
Toronto, Ontario
M7A 1L2

198

Ministry of Colleges and Universities

MEMORANDUM TO: DIRECTORS OF EDUCATION

RE: ASBESTOS HAZARDS

The mid 1979 survey to ascertain asbestos hazardous conditions made reference to the following types of materials:

1. Exposed fibrous materials applied to the ceilings and other surfaces within the building.

2. Fibrous materials applied to the underside of floor slabs, structural framing, columns etc. above suspended ceilings where the space is used as an air plenum.

3. Hard boards used as wall panels, counter tops etc. and floor tiles.

Samples of the materials described under Item 1 and 2 should be carefully collected and sent for analysis for asbestos content to the Occupational Health Laboratory of the Ontario Ministry of Labour. If the tested material contains asbestos fibres an assessment should be carried out to determine what corrective action should be taken by school boards and other educational authorities.

The method of collecting samples should be in accordance with the manual "Inspection of Buildings for Asbestos" produced by the Ministry of Labour. This manual was prepared for the Ministries of Education and Colleges and Universities and a copy is enclosed for your use.

The Architectural Services staff, Grants Policy Branch of the Ministries will assist school boards where necessary, to determine the most satisfactory corrective action in those cases where analysis reveals asbestos fibre content in the material.

D. A. Penny
Executive Director
Planning and Policy Analysis

January 25, 1980

Attachment

Ministry of Education
Ministry of Colleges and Universities
Ontario

Mowat Block, Queen's Park
Toronto, Ontario
M7A 1L2

APPENDIX II (c)

C... POLICY
NOV 3 1980
CAPITAL

MEMORANDUM TO: DIRECTORS OF EDUCATION

RE: ASBESTOS HAZARDS IN SCHOOLS

School boards are reminded of the need to include a copy of the approval of the Ontario Fire Marshal when submitting a request for final approval to the Ministry for asbestos correction work. This applies to work involving encapsulation, covering or removal.

It is essential that all safety precautions be enforced when asbestos work is being carried out. These apply to work procedures, the use of protective clothing and masks, the use of protective coverings for walls, floors, and equipment, the method of disposing of asbestos materials, the use of warning and danger signs, and the final building cleaning procedures. The recommendations for such precautions have been published and attention is directed to the following:

1. The Report of the Advisory Task Force on Asbestos in Schools, May 1980, published by the Metropolitan Toronto School Board.

2. Inspecting Buildings for Asbestos, December 1979, prepared for Ministries of Education/Colleges and Universities by Ontario Ministry of Labour, Occupational Health and Safety Division.

3. Asbestos-containing Materials in School Buildings, A Guidance Document, Parts 1 and 2, March 1979, published by the U.S. Environmental Protection Agency.

James Martin
for.

D. A. Penny
Executive Director
Planning and Policy Analysis

October 24, 1980

1980: GP8

To: REGIONAL DIRECTORS OF EDUCATION

Date: May 15, 1980

From: J. Martin - Director

Telephone: 5-6401

Subject: Allocation of Funds for Asbestos Hazards

File number: GA 400.02

It is intended that expenditures for the elimination of asbestos hazards will be considered for approval for grant purposes in 1980 and 1981.

The allocation of funds for this purpose will be controlled by Mr. T. Grootenboer of this office within the following parameters:

- The projects are to be financed out of current funds and the boards will receive grant through the normal general legislative grants process.
- Only those projects that are considered an immediate urgency are to be undertaken initially.
- Regional Offices must provide the name of the school board, the name of the school, describe the problem, the method of correction and the anticipated cost.
- In cases where the corrective measures undertaken are other than encapsulation (spray sealant), the Ministry's Architectural Services Section should be consulted prior to issuing any approvals.
- Retroactive approvals may be granted on projects involving the elimination of asbestos hazards following the allocation of funds arranged through Mr. T. Grootenboer.

Upon receipt of an allocation Regional Offices should confirm the continuing need for the school and may then issue a Building Program Approval.

For budgetary review purposes it is necessary to compile a complete record of estimated expenditure to eliminate asbestos hazards. Regional Offices are requested to gather data based on school board estimates of costs and scheduling and submit to Mr. T. Grootenboer of this office as soon as possible.

Grants Policy Branch

c.c. Superintendents of Business and Finance

Asbestos Hazards in Schools
The Basis on Which Advice is Given With Respect to Whether Asbestos Should be Encapsulated, Removed or Enclosed

The three known methods of eliminating asbestos hazards in schools are encapsulation, enclosure and removal, as briefly described below. The description includes their appropriateness of application upon which advices of Architectural Services to school boards are based:

1. Encapsulation: To encapsulate asbestos materials by spraying sealant over their exposed surfaces.

   Application:
   - For such asbestos products as fire stage curtains, asbestos ceiling tiles and wall panels.
   - For sprayed but well-adhered asbestos fireproofing materials and acoustic or decorative plaster where the added weight of encapsulant will not cause the asbestos materials to fall off from the surface to which they are originally applied.
   - For asbestos cementitious plaster ceilings.

2. Enclosure: To confine asbestos materials by constructing an enclosure.

   Application:
   - For confining asbestos materials in existing ceiling spaces by constructing a new ceiling provided that there are no building components or equipment in the ceiling space which require access for periodic repairs and maintenance and that water leaks into the ceiling space from above are not expected.
   - For confining and protecting asbestos materials in areas subject to physical damage or vandalism such as low-lying ceilings, bulkheads, and/or beams in gymnasiums and stairways.

3. Removal: To physically remove asbestos materials. (Removal often requires replacement with non-asbestos materials.)

   Application:
   - For eliminating asbestos release from spray-on fireproofing of long span steel structures when they flex or vibrate.
   - For eliminating asbestos fibres in air plenums where their release from sprayed fireproofing or from asbestos ceiling

tiles can contaminate the whole building through the ventilation system, particularly in the case of sprayed fireproofing which is friable.

- For preventing the crumbling of sprayed asbestos materials which are too friable to be encapsulated or which has a condition unsuitable for enclosure.

Comments:

A difficulty is experienced in determining the degree of friability of asbestos materials. Since the degree of friability largely determines the methods of treatment and since there is no instrument to measure it, the methods of treatment decided by individuals cannot be expected to be uniform or agreeable. It is hoped that experience will be gained from the initial stage of the asbestos control program so that more uniform or agreeable treatment can be decided for the later stage of the program.

As a reminder to school boards when giving advices on the methods of treatment, Architectural Services stresses the use of approved encapsulants only for encapsulation work and safety precautions in carrying out the work.

APPENDIX V

Asbestos Hazards in Schools
Inventory of Materials Used as Substitutes for Asbestos

Material	Manufactured by	Frequency of Use*
A/D Type F.P.	Double A/D Distributors Limited Scarborough, Ontario	12
Monokote Mk 5	W.R. Grace & Company of Canada Limited Ajax, Ontario	3
JET-SULATION, Type 400	Air-O-Therma Co. Ltd. Chicago, Ill.	1
Spraycraft C	Spraycraft Corporation Markham, Ontario	3
Cafco DC-F	United States Mineral Products Company Stanhope, N.J.	1
Armstrong Georgian Fireguard (panels)	Armstrong Cork Industries Limited Montreal, Quebec	3
Gypsum board	Several suppliers	2
Standard Plaster	Several suppliers	1
Acoustic tiles	Several suppliers	1

*As identified in Ministry of Education files of approved asbestos control projects.

23.3.81.

GRANTS POLICY
MAR 3 1981
CAPITAL

Ontario

Ministry of the Solicitor General

Office of the Fire Marshal

Public Safety Division

590 Keele Street
Toronto, Ontario
M6N 4X2

February 26, 1981

Telephone. 965-485

C. REF
FILE

Mr. S. T. Orlowski
Associate Chief Architect
Grants Policy Branch
Ministry of Education
19th Floor, Mowat Block, Toronto

MAR 2 - 1981
TO

Re: Replacement Fire Protection Materials
Asbestos Treatment Program

ACTION TAKEN & DATE

Dear Stan:

As requested in our telephone conversation of Feb. 26th, I would advise the materials listed below have been specified by School Boards, or their agents, as replacement fire protection materials for structural steel members where sprayed asbestos fire protection has been removed.

In assessing these materials, I have assessed them from a fire safety standpoint only, based on test data available from such sources as Underwriter's Laboratories of Canada, Underwriter's Laboratories Inc., the National Research Council of Canada etc. This Office, in assessing any construction product, only considers its effect on the fire safety of the building and its occupants.

The following products are acceptable as replacement fire protection for asbestos on structural steel members:

1. Fire-rated gypsum wallboard
2. Plaster
3. Sprayed fibre fire protection materials listed by ULC or ULI. To the best of my knowledge, the products presently listed do not contain any asbestos and I believe are generally of a mineral wool composition. The manufacturers of such products include Cafco Products Ltd.(Mississauga, Ont.); Cem-Al Products Ltd.(Markham, Ont.); Double A/D Distributors Ltd.(Scarborough); Spraycraft Corp. (Brooklyn, New York); Spraydon Corp. (Fort Lauderdale, Fla.); and Jet-Sulation Spray Insulation, manufactured by Air-O-Therm Co. Ltd. (Elk Grove Village, Illinois).

continued/2

4. Cementitious mixtures. These include such manufacturers as Carboline Company (St. Louis, Missouri); Construction Products Division - W. R. Grace & Co. of Canada Ltd. (Ajax, Ont.); F. Hyde & Co. Limited (Montreal, Quebec); Sylvagard Co. Ltd. (Scarborough, Ont.).

(While some of the products referred to in items 3 and 4 have not, as yet, been specified in asbestos replacement programs, all would be acceptable because they are currently listed by UL. For further information on these products you may wish to contact the manufacturers and/or Mr. Peter Higginson, P. Eng. of Underwriter's Laboratories of Canada).

5. Membrane ceiling protection. The fire protection materials referred to in items 1 through 4 would be wrapped around the structural steel members (as was the asbestos fire protection which was removed). Another method of replacement would be to install a fire-rated ceiling below the structural steel members. Fire-rated ceilings usually incorporate such materials as fire-rated gypsum board, or plaster, or fire-rated acoustical tiles. These tiles are listed by Underwriter's Laboratories. During a number of earlier telephone conversations we have discussed the composition of these panels. There would appear to be problems in determining the exact composition of these tiles. I have been given to understand tiles presently on the market incorporate either no asbestos or a low percentage of asbestos, but I have been advised acoustical panels have been found, which were manufactured some years ago, which incorporate a substantial percentage of asbestos.

Trusting the above information is satisfactory.

Yours truly,

Keith Reilly

K. G. Reilly, P. Eng.
Consulting Services.

APPENDIX VII

SEALANT MATERIALS TESTED BY BATTELLE LABORATORIES FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND FOUND SATISFACTORY FOR ASBESTOS ENCAPSULATION

Material	From
Decadex Firecheck	Pentagon Plastics 7659C Fullerton Rd. Springfield, Va. 22153 Tel: 703-569-5277
554-21-1	H.B. Fuller Company Foster Division Box 625 Springhouse, Penn. 19477 Tel: 215-628-2600
X-61-2 Also known as OX line ABC sealer	Lehman Bros. Corp. 22 Halladay Street Jersey City, N.J. 07304 Tel: 201-434-1882
Cafco Bond Seal	United States Mineral Products Co. Flanders Road Stanhope, N.J. 07874 Tel: 201-347-1200
*Ocean 666	Flame-Crete Co. Ltd. Ottawa, Ontario

*Added to list on March 23, 1981

Material	From
K-13 Sprayed Cellulose	National Cellulose Corporation 12315 Roben Blvd. Houston, Texas 77045 Tel:713-433-6701
Pleco-glo	Makus Development Corporation P.O. Box 31 Mercer Island, Belleview Washington. Tel:206-641-7373

PROCEDURE FOR INVESTIGATING AND REGULATING THE USE OF BUILDING MATERIALS THE USE OF WHICH CREATES AN APPARENT HEALTH HAZARD TO OCCUPANTS OR USERS OF A BUILDING

1. An interministerial committee shall be established made up of representatives from the Ministries of Consumer and Commercial Relations, Environment, Health and Labour. The Committee shall be chaired by a representative from the Ministry of Consumer and Commercial Relations.

2. It shall be the function of the Committee to review the need for research into the potential health hazards to occupants or users of buildings created by the building materials used in such buildings and to recommend appropriate regulations under The Building Code Act.

3. A request for the review of the health hazard of any building material may be made of the Committee by any ministry or by the Building Materials Evaluation Committee established under The Building Code Act. Referral to the Committee shall be through the Chairman of the Committee.

4. Where a building material is referred to the Committee for consideration the Committee shall decide which ministry or ministries should carry out the literature review of research into the health hazards of the material or such other research as may be justified having regard for the nature of the material and the potential hazard under consideration.

5. From the review carried out under paragraph four, the Committee shall determine whether an initial recommendation can be made concerning the material or whether more detailed investigations or research are necessary.

6. The ministry or ministries carrying out the research shall report back to the Committee and the Committee shall on the basis of such report make recommendations that the use of the building material should be,

   a. prohibited immediately;

   b. prohibited after allowing a reasonable time for further study or corrective action concerning any apparent harmful effects;

   c. allowed for use with certain controls or limitations; or

   d. allowed for use without qualification.

7. The Committee shall report its recommendations to the Deputy Ministers' Committee on Occupational and Environmental Health for review and consideration. The Deputy Ministers' Committee on Occupational and Environmental Health shall recommend to the Ministry of Consumer and Commercial Relations the course of action that should be taken in respect of the material. These recommendations will also deal with the question of further research and the need if any for public consideration of any proposed regulation.

8. The Ministry of Consumer and Commercial Relations shall prepare the appropriate submissions to Cabinet and take such other actions such as the distribution of proposed regulations for public comment as may be required.

9. The ministries involved in any review investigation or research related to building materials referred to the Committee shall bear their own cost of such involvement.

10. Where as a result of this review the use of a material is prohibited or made subject to prohibition unless subsequent testing demonstrates the safe use of the material, the cost of any further testing required to overcome the prohibition order will be the responsibility of the person wishing to avoid the prohibition.

MARCH 19, 1981

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UNIVERSITY OF WINDSOR

WINDSOR, ONTARIO N9B 3P4
TELEPHONE: AREA CODE 519
253-4232

April 9, 1981

Dr. S. Dupré,
Chairman,
Royal Commission on
Matters of Health and
Safety Arising from
the Use of Asbestos in
Ontario,
180 Dundas Street W.,
22nd Floor,
Toronto, Ontario,
M5G 1Z8

Dear Dr. Dupré:

Thank you for allowing me to make a few comments at the Commission's recent public hearing in Windsor. Since doing so, I have prepared the enclosed written brief carrying two recommendations for the consideration of the Commission. As the first of these carries implications for the University of Windsor, I have sent copies of my brief to the President and other senior officials of the University who have indicated an interest in possible further discussions along the line suggested.

Sincerely,

Frank C. Innes

Frank C. Innes
Professor of Geography
Department of Geography

FCI:sk
Encl.

A BRIEF PRESENTED TO THE ONTARIO ROYAL COMMISSION ON MATTERS OF HEALTH AND SAFETY ARISING FROM THE USE OF ASBESTOS IN ONTARIO FOLLOWING AN ORAL PRESENTATION AT WINDSOR FRIDAY, MARCH 27th, 1981

by

PROFESSOR FRANK INNES
MEDICAL GEOGRAPHY
UNIVERSITY OF WINDSOR

RECOMMENDATION I:

Whereas the University of Windsor does not have a Medical School, but nevertheless is a center of learning and research; it is suggested that this resource be strengthened to provide a first line of response to those concerned with hazardous working situations in the local region. Specifically it is recommended that the University be funded to establish an Occupational and Environmental Health and Safety Centre to conduct research and supply adequate professional support for trade union and community organisations primarily in the counties of Essex, Kent and Lambton, Ontario.

DISCUSSION:

Some thirty faculty from fields as diverse as Engineering, Chemistry, Business Administration, Biology, Nursing, Biostatistics, Social Work, Human Kinetics, Sociology, Law and Geography presently constitute an ad hoc Health Studies group. Current research includes studies on noise, micro organisms in local fresh water bodies, nutrition, stress and geographic patterns of incidence of lung cancer and ischemic heart mortalities as well as incidence of schizophrenia. Equipment includes electron microscopes, engineering

materials laboratories, photospectrometers, computer facilities and a computer graphics installation, and close liaison is maintained with the local social agencies, hospitals and medical association. Moreover in 1977 Dr. Melvyn Howe, Strathclyde University, Scotland was a Health and Welfare Visiting Professor at Windsor and recommended the establishment of a Health Studies Institute after an evaluation of the local potential. (Report attached).

Progress has been made internally towards implementation of such a centre and currently it is under consideration by the University's Development Fund Committee. However, this, given current financial restraints on operational grants to Ontario Universities, implies implementation only if private sources of funding can be found. In view of the recent documents from OCUA, etc., it is suggested that the Provincial Government through an appropriate Ministry might contract an arrangement to enable the University to develop the capability to establish a centre on the understanding that additional funds would be sought from the community.

RECOMMENDATION II:

It is recommended that the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario endorse recommendation 94 of the Report of the Commission of Inquiry into the confidentiality of health information, thereby enabling qualified researchers to undertake adequate studies of an epidemiological sort into disease and that the Royal Commission on

Matters of Health and Safety Arising from the use of Asbestos in Ontario recommend a comparable access to files held by employers, unions and government departments containing health data related to the work environment.

DISCUSSION:

The Honourable Marc Lalonde in the study, "A New Perspective on the Health of Canadians," Government of Canada 1974, notes that:

> "Physicians, surgeons, nurses and hospitals together spend much of their time in treating ills caused by adverse environmental factors and behavioural risks."

Insofar as this is true the evaluation of the total man environment relationship calling for a team approach of scientists to explore the dimensions of this problem is required, and this must include biologists, psychologists, chemists, geologists, sociologists, geographers and others. Thus such teams in conjunction with more traditional medically trained epidemiologists and statisticians must be able to access and/or create data banks that can be cross-linked.

For instance one might take the case of childhood lead poisoning reported by Dr. Hunter, Professor of Geography, and of Community Health Science at Michigan State, in Social Science and Medicine 1977 and 1978. Here records of pediatric plumbism had to be linked to data on type and age of house paint, exact location of dwellings and length of residence, volume of traffic, solar radiation and temperature measurements and seasonality of diagnosis,

etc. Thus detailed data bank cross-linkage is usually called for that is person specific in such total evaluations and only when this approach is taken can the relative significance of multi-factorial disease agents be ascertained. Only when this is available will, for instance, the significance of personal habits such as cigarette use and genetic type be cross-linked to levels of asbestos exposure in anything approaching a full etiology of disease. Hence our recommendation to have maximum, albeit controlled, access of data given to all qualified researchers; and it might be noted, qualification here, as suggested in the Krever report, can not be narrowly defined to only include those with Medical degrees or formal Hospital affiliation.

FINALLY A COMMENT:

The University of Windsor Health studies team submitted a bid in early 1980 to undertake a study for the Bendix Corporation of Southfield, Michigan into asbestos related disease amongst its employees. In connection with this, we visited the Windsor plant and were able to examine the company's data files; these most certainly were not complete, back to the 1940's, but since 1977 full-information was kept by the Company on production workers by department, etc. Additional card files, somewhat less complete, were available for the period 1965-1977. In bidding for the contract however we indicated that a maximum of 2,000 employees back to 1940, to 325 employees in the Spring of 1980, was a small group statistically and that therefore we wanted to bid on the comprehensive study sought by the company to cover in addition to the

Windsor plants,their six American locations. Furthermore we required agreement to work with the Union and to seek to enlarge our data base by interviewing techniques. We assume our bid was rejected at least in part because of these conditions.

Some Observations by G. Melvyn Howe, D.Sc., Visiting Professor (Health & Welfare Canada) after six months at the University of Windsor.

'Food for Thought' for Dr. F. Innes (Geography), Professor B. J. Kroeker (Social Work), Mrs. A. Temple (Nursing) et al.

During my stay at the University of Windsor I have spoken locally and elsewhere in Canada and the U.S.A. on various aspects of Medical Geography. The term 'Medical Geography' is used to describe the spatial approach to the study of man's maladjustments to environmental hazards in the different parts of the world as expressed by different disease patterns. My purpose has been to demonstrate a macro- and meso-approach, and, at the same time, a different approach to the possible elucidation of the aetiology of such diseases as cancer and cardiovascular disease, and diseases which now scourge urban-industrialised societies. Different from workers elsewhere, and particularly in the North American continent, I view medical geography as a counterpoint to curative medicine and the provision of health care services which appear to be amply catered for. In short medical geography comes within preventive medicine. It highlights the importance of physical, biological and socio-cultural hazards in the environment,-though in no ways belittling life style and human biology,-as in influencing, and maybe causing, human disease in local areas.

To my very great surprise this field or approach is almost completely neglected in North America. As I have stated, the emphasis appears to be on health care and curative medicine generally. This being so I would urge the University of Windsor to lower, or indeed remove, traditional academic barriers between disciplines, professions and vocations so that interested members of Faculty in the Schools or Departments of, for example, Social Work, Nursing, Geography, Home Economics, Human Kinetics, Engineering, Geology, etc., might pool their expertise and collaborate in group projects oriented to the solution of selected health/disease problems. Such collaborative investigations might be carried out under the aegis of an Institute of Health Studies. Such an Institute might, at a later date, provide interdisciplinary courses and possibly offer a Diploma in Health Studies. With experience it might be possible to upgrade to a Master's degree or even a Doctoral degree. It seems to me that nothing but good could come from such interdisciplinary work and

corporate endeavour in 'community' and 'self-specific' environments.

The University of Windsor has, in my view, a superb library and adequate holdings and/or easy access to all relevant literature while core Departments or Schools of the envisaged Institute (e.g., Geography, Social Work, Nursing) are adequately equipped (apart from Geography which is woefully deficient in cartographic and photographic personnel and equipment). I have already briefed 'Statistics Canada' in Ottawa on the need for locality-specific demographic and population data and have discussed with Dr. J. R. Jones, Medical Officer of Health for Metro Windsor-Essex County Health Unit the need for appropriate medical data. Much goodwill has been forthcoming from both sources and I am confident that all relevant non-confidential medical data will be forthcoming.

Mr. Eric Christou, holder of the National Health Short-Term Studentship which I applied for to assist me into an inquiry into spatial patterns of cardiovascular disease in Windsor, is making good progress as are Drs. Innes and LaValle with a similar inquiry involving lung cancer. It is my sincere desire that these small beginnings in the University of Windsor will develop to the extent that the proposed Institute of Health Studies will become a centre of excellence and in the van of the new approach to health matters, which I have endeavoured to publicize these last six months and which the Honourable Marc Lalonde has so ably presented in his valuable working document 'A New Perspective on the Health of Canadians'.

It is my earnest hope that I shall have the pleasure in years to come of visiting Canada again to find the proposed Institute of Health Studies firmly established and nationally, perhaps, internationally recognised.

Melvyn Howe

G. Melvyn Howe

20 June 1977.